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NATIONAL DAM SAFETY PROGRAM. POGUE LAKE DAM (MO 30127), MISSISS--ETC(U)
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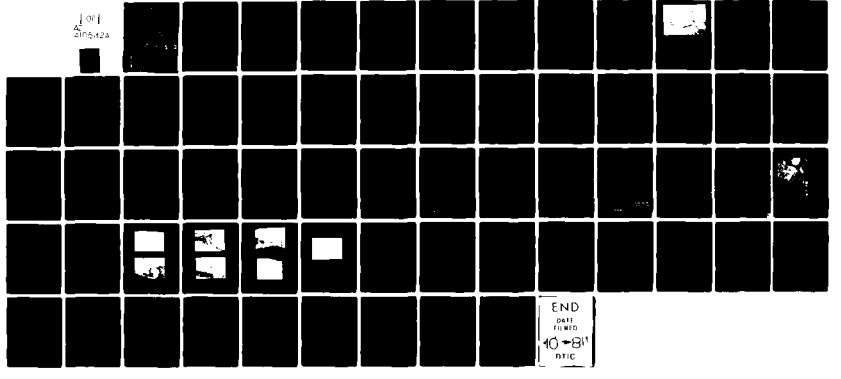

LEVEL II

AD A105324

MISSISSIPPI-KASKASKIA-ST. LOUIS BASIN

POGUE LAKE DAM
MADISON COUNTY, MISSOURI
MO 30127

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY INSPECTION

United States Army
Corps of Engineers
...Serving the Army
...Serving the Nation

St. Louis District

PREPARED BY: U.S. ARMY ENGINEER DISTRICT, ST. LOUIS

FOR: STATE OF MISSOURI

APRIL 1981

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This report was prepared under the National Program of Inspection of Non-Federal Dams. This report assesses the general condition of the dam with respect to safety, based on available data and on visual inspection, to determine if the dam poses hazards to human life or property.

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DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
210 TUCKER BOULEVARD, NORTH
ST. LOUIS, MISSOURI 63101

REPLY TO ATTENTION OF

SUBJECT: Pogue Lake Dam Phase I Inspection Report

This report presents the results of field inspection and evaluation of the Pogue Lake Dam (MO 30127).

It was prepared under the National Program of Inspection of Non-Federal Dams.

This dam has been classified as unsafe, non-emergency by the St. Louis District as a result of the application of the following criteria:

a. Spillway will not pass 50 percent of the Probable Maximum Flood without overtopping the dam.

b. Overtopping of the dam could result in failure of the dam.

c. Dam failure significantly increases the hazard to loss of life downstream.

SUBMITTED BY: SIGNED
Chief, Engineering Division

30 JUN 1981
Date

APPROVED BY: SIGNED
Colonel, CE, Commanding

2 JUL 1981
Date

POGUE LAKE DAM

Madison County, Missouri

Missouri Inventory Number 30127

Phase I Inspection Report

National Dam Safety Program

Prepared by

Woodward-Clyde Consultants

Chicago, Illinois

Under Direction of

St Louis District, Corps of Engineers

for

Governor of Missouri

April 1981

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams for Phase I Investigations. Copies of these guidelines may be obtained from the Office of the Chief of Engineers, Washington, D. C., 20314. The purpose of a Phase I investigation is not to provide a complete evaluation of the safety of the structure nor to provide a guarantee on its future integrity. Rather the purpose of the program is to identify potentially hazardous conditions to the extent they can be identified by a visual examination. The assessment of the general condition of the dam is based upon available data (if any) and visual inspections. Detailed investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify the need for more detailed studies. In view of the limited nature of the Phase I studies no assurance can be given that all deficiencies have been identified.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with any data which may be available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action removes the normal load on the structure, as well as the reservoir head along with seepage pressures, and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected, so that corrective action can be taken. Likewise continued care and maintenance are necessary to minimize the possibility of development of unsafe conditions.

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam	Pogue Lake Dam
State Located	Missouri
County Located	Madison
Stream	Greasy Creek
Date of Inspection	25 February 1981

Pogue Lake Dam, Missouri Inventory Number 30127, was inspected by Richard Berggreen (engineering geologist), Pierre Mallard (geotechnical engineer), Jean-Yves Perez (geotechnical engineer), and Sean Tseng (hydrologist). The dam is an earth dam constructed for recreational purposes.

The dam inspection was made following the guidelines presented in the "Recommended Guidelines for Safety Inspection of Dams." These guidelines were developed by the Chief of Engineers, US Army, Washington, DC, with the help of federal and state agencies, professional engineering organizations, and private engineers. The resulting guidelines represent a concensus of the engineering profession. These guidelines are intended to provide for an expeditious identification of those dams which may pose hazards to human life and property, based on available data and visual inspection of the dam. In view of the limited nature of the study, no assurance can be given that all deficiencies have been identified.

The St Louis District (SLD), Corps of Engineers, has classified this dam as having a high hazard potential. The potential damage zone length estimated by the SLD extends approximately 2.5 mi downstream of the dam. Within this zone are several occupied dwellings and assorted farm buildings. Because of the relatively sparce population and the small storage capacity of the reservoir, it is recommended that 50 percent of the Probable Maximum Flood (PMF) be used as the spillway design flood. The PMF is defined as the flood event that may be expected to occur from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region.

Pogue Lake Dam is in the small size classification, based on its maximum height of 18 ft and on its reservoir storage volume of approximately 74 ac-ft. The small dam classification includes dams between 25 and 40 ft in height, or having storage volumes between 50 and 1000 ac-ft.

Our inspection and evaluation indicate the dam to be in generally fair to poor condition. This evaluation is primarily based on the hydrologic analyses which indicate that a flood greater than 13 percent of the PMF will effectively overtop the dam. The dam will be overtopped by the 1 percent probability-of-occurrence (100 year) flood event. No record or evidence of overtopping of the dam was noted during the visual inspection. The 1 percent probability-of-occurrence event is defined as the flood that has 1 percent chance of occurring in any one year, or occurs on the average once in every 100 years. Erosion of the unlined or damaged portion of the spillway may occur during flooding events which do not overtop the dam. Seepage and stability analyses comparable to the recommended guidelines were not on record, which is considered a deficiency.

Based on our evaluation of the information obtained from the visual inspection and other available information, the following specific recommendations are made for Pogue Lake Dam.

1. Prepare a more detailed hydraulic/hydrologic analysis and design a spillway and discharge channel capable of passing the spillway design flood without overtopping the embankment. The spillway should be protected to prevent erosion.

2. Perform seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams."

3. Extend the riprap zone below the outlet pipe to provide erosion protection or repair the outlet pipe guillotine gate valve so that it does not leak.

4. Repair the concrete slab in the spillway so that erosion downstream of the shallow cut-off wall does not occur.

5. Evaluate the feasibility of a warning system to alert downstream residents in the event hazardous conditions develop at the dam during periods of heavy precipitation.

6. Implement a program of periodic inspections for the dam and appurtenant structures. These inspections should report on any recommended maintenance. Records of the inspections and maintenance performed should be kept.

It is recommended that these remedial measures and studies be addressed without undue delay. All remedial measures and studies should be performed by, or under the supervision of, an engineer experienced in the design and construction of earth dams.

WOODWARD-CLYDE CONSULTANTS

Richard G. Berggreen
Registered Geologist, No. 3572, CA

Jean-Yves Perez, PE, No. 62-34675, IL
Vice-President

OVERVIEW

POGUE LAKE DAM

MISSOURI INVENTORY NUMBER 30127

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
POGUE LAKE DAM - MISSOURI INVENTORY NO. 30127
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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
POGUE LAKE DAM, MISSOURI INVENTORY NO. 30127

SECTION 1
PROJECT INFORMATION

1.1 General

a. **Authority.** The National Dam Inspection Act, Public Law 92-367, provides for a national inventory and inspection of dams throughout the United States. Pursuant to the above, an inspection was conducted of Pogue Lake Dam, Missouri Inventory Number 30127.

b. **Purpose of Inspection.** "The primary purpose of the Phase 1 investigation program is to identify expeditiously those dams which may pose hazards to human life or property... The Phase I investigation will develop an assessment of the general condition with respect to safety of the project based upon available data and a visual inspection, determine any need for emergency measures, and conclude if additional studies, investigations and analyses are necessary and warranted" (Chapter 3, "Recommended Guidelines for Safety Inspection of Dams").

c. **Evaluation criteria.** The criteria used to evaluate the dam were established in the "Recommended Guidelines for Safety Inspection of Dams," and Engineering Regulation No. 1110-2-106 and Engineering Circular No. 1110-2-188, "Engineering and Design National Program for Inspection of Non-Federal Dams," prepared by the Office of Chief of Engineers, Department of the Army; and "Hydrologic/Hydraulic Standards Phase I Safety Inspection of Non-Federal Dams," prepared by the St Louis District (SLD), Corps of Engineers. These guidelines were developed with the help of several federal agencies and many state agencies, professional engineering organizations, and private engineers.

1.2 Description of Project

a. **Description of dam and appurtenances.** Pogue Lake Dam is a curved earth embankment, convex downstream, approximately 440 ft long and 18 ft in height (Fig 3-A and 3-B), impounding a lake used for recreational purposes. The embankment is grass-covered on the crest and downstream face. The spillway is located at the right abutment (as the observer faces downstream), there are no control structures in the spillway, and the concrete slab at the spillway is severely broken. A low level outlet is located near the left end of the dam. This outlet structure is an 18-in. diameter metal pipe with a guillotine gate at its downstream end. The discharge channels from both the spillway and the outlet are eroded to bedrock.

b. **Location.** The dam is located on Greasy Creek, approximately four miles northwest of Marquand, in Madison County, Missouri (Fig. 1). The dam is in Section 14, T32N, R7E, on the USGS Marquand (1980) 7.5-minute quadrangle map.

c. **Size classification.** The dam is classified small based on its height of 18 ft and storage volume of approximately 74 ac-ft. The small dam classification includes dams between 25 and 40 ft in height, or having storage volumes between 50 and 1000 ac-ft.

d. **Hazard classification.** The St Louis District (SLD), Corps of Engineers, has classified this dam as having a high hazard potential; we concur with this classification. The SLD estimated damage zone length extends approximately 2.5 mi downstream of the dam. Several occupied dwellings and assorted farm buildings are located in the estimated damage zone (Photo 1). The downstream hazards were verified by aerial reconnaissance and on the ground by the inspection team.

e. **Ownership.** Pogue Lake Dam is reportedly owned by Dr K. Diamond, 2316 Jeanan, Cape Girardeau, Missouri 63701, and Mr R. Reichardt, Route 1, Box 164, Marquand, Missouri 63655.

At the time of inspection, Mr Reichardt maintained a residence upstream of the lake and was present during the inspection.

f. **Purpose of dam.** The reservoir impounded by the dam is used for recreational purposes.

g. **Design and construction history.** Information on the design and construction of the dam was obtained from Mr Reichardt. No construction reports were available.

The dam was reported by Mr Reichardt to have been constructed by Hahn Farming and Construction, Fredericktown, Missouri, in 1973-1974. The contractor was contacted but no information could be obtained on the design or construction. The dam was reported by Mr Reichardt to be founded on shallow bedrock.

h. **Normal operating procedures.** There are no formal operational procedures for this facility. Flood flows pass through the uncontrolled spillway. The low level outlet is operated about every year to lower the lake approximately 3 ft and kill the weeds.

1.3 Pertinent Data

a. **Drainage area.** 2.95 mi^2

b. **Discharge at damsite.**

Maximum known flood at damsite	Unknown
Warm water outlet at pool elevation	N/A
Diversion tunnel low pool outlet at pool elevation	N/A
Diversion tunnel outlet at pool elevation	N/A
Gated spillway capacity at pool elevation	N/A
Gated spillway capacity at maximum pool elevation	N/A
Ungated spillway capacity at maximum pool elevation	1540 ft^3/sec
Total spillway capacity at maximum pool elevation	1540 ft^3/sec

c. **Elevation (ft above MSL).**

Top of dam	770.5 to 772.6
Maximum pool - design surcharge	N/A
Full flood control pool	N/A
Recreation pool	767.1
Spillway crest (gated)	N/A
Upstream portal invert diversion tunnel	N/A
Downstream portal invert diversion tunnel	N/A
Streambed at centerline of dam	Unknown
Maximum tailwater	Unknown
Toe of dam at maximum section	754.2

d. **Reservoir.**

Length of maximum pool	1600 ft
Length of recreation pool	1400 ft
Length of flood control pool	N/A

e. **Storage (acre-feet).**

Recreation pool	43
Flood control pool	N/A
Design surcharge	N/A
Top of dam	74

f. **Reservoir surface (acres).**

Top of dam	10.7
Maximum pool	10.7
Flood control pool	N/A
Recreation pool	7.7
Spillway crest	7.7

g. **Dam.**

Type	Earth
Length	440 ft
Height	18 ft
Top width	Between 10 and 12 ft
Side slopes	Upstream 3.3(H) to 1(V) on exposed portion. Downstream 2.2(H) to 1(V)
Zoning	Unknown; probably none
Impervious core	Unknown; probably homogeneous impervious embankment
Cutoff	Unknown; probably trench to shallow bedrock
Grout curtain	Unknown; probably none

h. **Diversion and regulating tunnel.**

Type	None
Length	N/A
Closure	N/A
Access	N/A
Regulating facilities	N/A

i. **Spillway.**

Type	Concrete-lined (broken), trapezoidal, uncontrolled; sides of spillway unlined.
Length of weir	88 ft
Crest elevation	767.1 ft
Gates	None
Downstream channel	Channel eroded to bedrock; unobstructed.

j. **Regulating outlets.** 18-in. diameter metal pipe with guillotine gate at downstream end. Projects about 6 to 8 ft from downstream face of dam. Can lower reservoir surface about 3 ft below spillway crest.

SECTION 2
ENGINEERING DATA

2.1 Design

No design drawings or reports were available for this dam.

2.2 Construction

There were no construction reports available for this dam. Hahn Farming and Construction, the company that built the dam, was contacted but no information could be obtained on the construction of the dam. The dam was reported by Mr Reichardt to be constructed on shallow bedrock. No other information was available on the construction of the dam.

A concrete wall cut-off, which extends approximately 4 ft below the lake level, was constructed on the upstream side of the spillway in 1978 to avoid erosion of soil below the concrete slab. The construction traffic broke the concrete slab which is scheduled to be rebuilt soon.

2.3 Operation

According to Mr Reichardt, the low level outlet is operated every year to lower the lake approximately 3 ft below the spillway crest for weed control in the reservoir.

2.4 Evaluation

a. **Availability.** The only information available on design or construction of the dam was through interviews with the co-owner of the dam, Mr Reichardt.

b. **Adequacy.** The available engineering, design and construction data are insufficient to evaluate the design of this dam. Seepage and stability analyses comparable to the "Recommended Guidelines for Safety Inspection of Dams" are not on record, which is considered a deficiency. These seepage and stability analyses should be performed for appropriate loading conditions,

including earthquake loads, and made a matter of record. The analyses should be performed by an engineer experienced in the design and construction of earth dams.

c. **Validity.** Not applicable.

2.5 Project Geology

The dam is located on the southeast flank of the Ozark structural dome. The regional dip is toward the southeast, but local variations occur in the vicinity of exposed and buried Precambrian bedrock knobs. The bedrock in the area is mapped as Precambrian age St Francois Mountains Volcanic Supergroup (Fig. 4), consisting of rhyotile and felsite volcanic rock. Cambrian age shaly dolomite of the Elvins Group and Bonneterre Formation are also mapped in the area (Fig. 4), and may be the bedrock outcropping in the discharge channel below the spillway.

The soil (used in the dam construction) is composed of gravelly to sandy, silty clay (CL) and clayey silt (ML). The material was sampled and classified in the field. The erosion potential of the soil was judged moderate to high in the event the embankment is overtopped. The soil is mapped on the General Soils Map of Missouri (1979) as Peridge-Cantwell-Gasconade Soil Association.

Several faults are mapped in the vicinity of the dam site. The Greenville Fault, located about 8 mi south of the dam, is a northeast-southwest trending fault approximately 38 mi long. The fault is mapped as northwest side up.

A branch of the Simms Mountain Fault System is mapped approximately 9 mi northeast of the dam. This system is a complex branching series of faults about 40 mi in length, trending northwest-southeast. Displacement on the fault system is generally southwest side up.

These faults, like most others in the Ozark region, occur in Precambrian and Paleozoic bedrock and are likely Paleozoic in age. The area is not seismically active and these faults are not considered to pose an unusual hazard to the dam.

The dam is located approximately 70 mi northwest of the line of epicenters for the very large New Madrid earthquakes of 1811 and 1812. A recurrence of an earthquake of the magnitude of the New Madrid events could cause damage to the dam; however, an evaluation of this risk is beyond the scope of this Phase I investigation.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. General. A visual inspection was made of Pogue Lake Dam on 25 February 1981. Mr Reichardt, one of the owners of the dam, met with the inspection team at the dam. The visual inspection suggests that the dam is in generally good condition from a viewpoint of structural integrity and stability.

b. Dam. The dam is an earth embankment constructed of locally obtained soil. The embankment materials consist of gravelly to sandy, silty clay (CL) and clayey silt (ML).

The soil appears to have a moderate to high erosion potential due to its cohesion and vegetation cover. However, erosion sufficient to pose a hazard to the dam could occur if the embankment were overtopped for a long duration.

The downstream slope of the embankment is typically 2.2(H) to 1(V). Vegetation on the dam crest and downstream slope consists of grass, weeds and small bushes. A cut stump is present on the upstream face (Photo 2). The tree was probably there before the dam was constructed and was cut during construction or after the dam was completed.

The upstream face of the dam slopes about 3.0(H) to 1(V) and does not show any evidence of erosion. The waterline is very close to the top of the dam (Photo 3).

Some erosion at the toe of the dam due to leaking of the outlet pipe was noticed (Photo 4). Gravel protection has been installed but does not extend sufficiently far onto the embankment to protect all the area subject to erosion.

The dam crest did not show any evidence of disruption of the vertical or horizontal alignment (Photo 3). No evidence was noted of cracking, slumping or excessive settlement of the embankment slopes, sinkhole development, or animal burrows. No seepage was noted at the base of the dam. No evidence

of significant erosion was noted on the embankment or at the junction of the embankment and left abutment, except the limited erosion due to the leaking outlet pipe at the toe of the dam.

c. **Appurtenant Structures.**

1. Spillway. The spillway is a trapezoid-shaped, uncontrolled rock and earth channel located at the right abutment of the dam (Overview Photo). A concrete slab, about 6 ft wide, extends across the spillway; at the time of inspection, this concrete slab was severely broken (Photo 5). Upstream of the spillway, a concrete cutoff wall has been installed in an effort to prevent erosion of the soil below the concrete slab by seeping water. The sides of the spillway, at the abutment and junction with the dam, are unlined and could be subject to erosion during high flood flows. The broken concrete slab is also subject to erosion in its present condition.

At the time of inspection, water was flowing through the center of the spillway (Photo 6), both above and below the broken concrete slab to a depth of approximately 1 inch.

2. Low-level outlet. The low-level outlet is an 18-in. diameter steel pipe controlled by a manually operated guillotine gate. The gate was closed during the inspection but was leaking at an estimated rate of 50 gal/min (Photo 4). Although the end of the pipe extends about 6 ft away from the downstream slope of the dam, leaking water was eroding the toe of the dam, and a small pond had formed at the toe of the dam (Photo 4).

The inlet of the pipe, located slightly below the water level of the reservoir, has no trash rack, therefore has a potential for becoming clogged.

d. **Reservoir.** The slopes surrounding the reservoir are relatively steep on the left bank of the reservoir, on the order of 4(H) to 1(V); the right bank is almost flat. No sign of slope instability was noted. The area is mostly forested; no housing development, logging or agriculture was reported for the drainage basin. Upstream of Pogue Lake Dam are two other dams, Smitty's Catfish Pond Dam (MO 30613), and White Lake Dam.

e. **Downstream channel.** The downstream channel is a broad channel, eroded to bedrock (Photo 7). The right bank of the discharge channel is subject to significant erosion, with the channel migrating away from the dam. There is no apparent potential for natural obstruction of the channel.

3.2 Evaluation

The results of the visual inspection indicate the dam is in generally good condition from a viewpoint of structural integrity and stability. No evidence was noted of disruption of the vertical or horizontal alignment of the dam, slumping or cracking of the embankment slopes, sinkhole development or animal burrows. No evidence or report of overtopping was noted. No significant erosion was noted on the dam slopes except at the toe of the dam below the leaking outlet pipe. The grass and brush vegetation on the downstream slope and crest of the dam appears to provide adequate erosion protection for normal operating conditions. There is no erosion protection on the upstream face of the dam but the short fetch of the reservoir will likely produce only small waves and protection is probably not necessary.

The concrete slab of the spillway is broken and erosion downstream of the cut-off wall could endanger the stability of the cut-off wall. The erosion of the right slope of the downstream channel will not endanger the overall stability of the dam since this process migrates away from the dam. Erosion could also occur on the unlined sides of the spillway.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Procedures

The only facility requiring operations is the low-level outlet used to lower the lake approximately 3 ft. This is done during the winter so that snow and frost will kill the aquatic weeds along the shoreline.

4.2 Maintenance of Dam

No records of maintenance were available for this dam.

4.3 Maintenance of Operating Facilities

No records of maintenance of operating facilities were available for this dam.

4.4 Description of Any Warning System in Effect

A warning system was not identified in the inspection.

4.5 Evaluation

There is no formal maintenance program in effect for this dam. The spillway will require future maintenance to repair the broken concrete slab. The development of a maintenance program and an evaluation of a practical and effective warning system are recommended for this facility.

SECTION 5
HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. **Design data.** No hydrologic or hydraulic design data were available for evaluation of this dam or reservoir; however, dimensions of the dam were surveyed by James F. McCaul III and Associates of Potosi, Missouri. Other relevant data were measured during the visual inspection or estimated from topographic mapping. The maps used in the analyses were the USGS Cherokee Pass (1980) and Marquand (1980), Missouri 7.5-minute quadrangle maps.

b. **Experience data.** No recorded rainfall, runoff, discharge, or pool stage historical data were found for this reservoir. No evidence or record of overtopping was found during the visual inspection.

c. **Visual observation.**

1. Watershed. The watershed is undeveloped. The drainage area is covered primarily with dense forest and scattered pasture. The reservoir is small (less than 1%) compared to the drainage area of 2.95 mi^2. Two small reservoirs, Smitty's Catfish Pond (MO 30613) and White Lake, are located upstream of the reservoir.

2. Reservoir. The reservoir and dam are described in Section 3 of this report and by the maps and photographs enclosed herewith.

3. Spillway. A partially concrete-lined spillway is located at the west end of the dam. The concrete slab over the crest is broken. An 18-in. diameter low-level outlet pipe crosses through the dam. The invert of the pipe is about 3 ft below the normal water surface elevation. The outflow from the pipe can be regulated at the outlet. This pipe was assumed to be inoperative in the hydraulic/hydrologic analyses.

d. **Overtopping potential.** One of the primary considerations in the evaluation of the Pogue Lake Dam is the assessment of the potential for overtopping and consequent failure by erosion of the dam. The portion of the dam adjacent to the spillway was considered to be the top of the dam for the purpose of determining overtopping potential. With a pool elevation of 770.5 ft (13 percent of PMF), velocity in the spillway was calculated to be approximately 7.5 ft/sec. This velocity is considered likely to produce erosion of the unlined part of the spillway, and this erosion could progress to the point where it poses the hazard of an effective breach of the dam.

Hydraulic analyses of this dam for the 1 and 10 percent probability-of-occurrence floods and Probable Maximum Floods (PMF) were all based on initial water surface elevation equal to the lowest elevation on the spillway crest. The results of the analyses indicate that a flood greater than 13 percent of the PMF will effectively overtop the dam (causing severe erosion in the spillway). The PMF is defined as the flood event that may be expected to occur from the most severe combination of critical meteorologic or hydrologic conditions that are reasonably possible in the region. The analyses also indicate that the spillway will not be able to pass the 1-percent probability-of-occurrence (100-year) flood event without effectively overtopping the dam. The 1 percent probability-of-occurrence flood is the flood event that has a 1 percent chance of occuring in any year, or occurs on the average once in every 100-years. The total spillway capacity at the maximum pool elevation is approximately 1500 cfs.

The following overtopping data for various flood events were computed for the dam assuming no erosion of the spillway or embankment.

Precipitation Event	Maximum Reservoir W.S. Elev., ft (MSL)	Maximum Depth Over Dam, ft	Maximum Outflow, ft^3/sec	Duration of Overtopping, hours
1% Prob	771.4	0.9	2300	2.0
13% PMF	770.4	0.0	1500	0.0
50% PMF	772.9	2.4	5700	6.5
100% PMF	774.4	3.9	11400	9.0

It should be noted that, at the PMF, the depth of overtopping may reach 3.9 ft and the dam may be overtopped for 9 hours. Overtopping for this depth and duration is judged sufficient to develop a breach of the dam.

Our analyses indicate that it was not necessary to include the effects of a hypothetical breach of Smitty's Catfish Pond Dam, located upstream, because Pogue Lake Dam would overtop before the upstream dam. No information was available on overtopping or storage at White Lake Dam, a second small upstream dam.

Selection of a spillway design flood was complicated by an irregular valley downstream of the dam. The valley within 1-1/4 mi downstream includes two occupied dwellings and assorted barns and outbuildings, and varies from very narrow to quite broad. Beyond 1-1/4 mi, the valley is very broad and contains several more dwellings. On the basis of the sparse population in the area where the flood flows will be confined by the narrow valley and the small impounded capacity of the reservoir, 50 percent of the PMF is the recommended spillway design flood. This recommendation also considered it unlikely that a spillway capable of passing 11,400 ft^3/sec (100 percent of the PMF) would be constructed for this small dam.

Input data and output summaries for the hydrologic and hydraulic analyses are presented in the attached Appendix B.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. **Visual inspection.** The visual inspection of Pogue Lake Dam revealed that it is structurally in generally good condition. There was no evidence of lateral spreading or horizontal displacement of the dam crest. No evidence of sinkholes near the dam or in the surrounding area was noted. No cracking or slumping on the dam or in the area beyond the dam toe was identified. The downstream face was vegetated with grass and bushes. These grass and bushes will provide moderate erosion protection during normal operating conditions except at the outlet of the leaking low-level pipe where the riprap zone should be extended to protect the toe of the dam against erosion by leaking water. The embankment could be subject to erosion, however, if the dam was overtopped. The broken concrete slab at the spillway is considered a deficiency as erosion could undercut and reduce the stability of the cut-off wall upstream.

No seepage on the downstream slope or at the toe was observed. The erosion in the spillway and the downstream channel is not likely to endanger the structural stability of the dam.

b. **Design and construction data.** No design or construction records were available for this dam. Seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" were not available, which is considered a deficiency.

c. **Operating records.** No operating records or water level records are maintained for this facility.

d. **Post construction changes.** The only post construction change on this dam has been the construction, in 1978, of a concrete cut-off wall. This cut-off wall extends approximately 4 ft below the lake level, on the upstream side of the spillway, and was constructed to prevent erosion of soil from below the concrete slab.

e. **Seismic stability.** The dam is in Seismic Zone 2 to which the guidelines assign a moderate damage potential. During a seismic event, liquefaction of the gravelly, silty clay embankment material is unlikely. However, without knowledge of soil properties of the embankment materials, the seismic stability of the dam cannot be evaluated.

SECTION 7
ASSESSMENT/REMEDIAL MEASURES

7.1 Dam Assessment

a. **Safety.** Based on the visual inspection and results of the hydraulic/hydrologic analyses, the dam embankment and appurtenant facilities were judged to be in generally fair to poor condition. No evidence of sinkholes, detrimental settlement, slides or lateral spreading of the dam was found. Seepage and stability analyses comparable to the requirements of the guidelines were not available, which is considered a deficiency.

The hydraulic/hydrologic analyses indicate the dam will be overtopped by a flood greater than 13 percent of the Probable Maximum Flood (PMF), which is considered a deficiency. These analyses also indicate the dam will be overtopped by the 1 percent probability-of-occurrence flood (100-yr flood). The relatively sparse population in the downstream damage zone and the small storage capacity of the reservoir suggest that 50 percent of the PMF should be the recommended spillway design flood.

b. **Adequacy of information.** The visual inspection provided sufficient information to support the recommendations presented in this Phase I report. Seepage and stability analyses comparable to the "Recommended Guidelines for Safety Inspection of Dams" were not available; this is considered a deficiency which should be rectified.

c. **Urgency.** The deficiencies described in this report could affect the safety of the dam. The recommendations in Section 7.2b concerning the remedial measures for the embankment and spillway capacity should be acted on without undue delay.

d. **Necessity for Phase II.** In accordance with the "Recommended Guidelines for Safety Inspections of Dams," the subject investigation was a minimum study. This study revealed that additional in-depth investigations are needed to complete the assessment of the safety of the dam. Those investigations which

should be performed without undue delay, are described in Section 7.2b. It is our understanding from discussions with the SLD that any additional investigations are the responsibility of the owner.

7.2 Remedial Measures

a. **Alternatives.** There are several general options which may be considered to reduce the possibility of dam failure or to diminish the harmful consequences of such a failure. Some of these options are listed below.

1. Remove the dam, or breach it to prevent storage of water.

2. Increase the height of dam and/or spillway size to pass the spillway design flood (50 percent of PMF) without overtopping the dam.

3. Purchase downstream land that would be adversely impacted by dam failure, and restrict human occupancy.

4. Provide a highly reliable flood warning system (generally does not prevent damage but diminishes chances for loss of life).

b. **Recommendations.** Based on our inspection of Pogue Lake Dam, it is recommended that the following remedial measures and studies be addressed without undue delay.

1. Prepare a more detailed hydraulic/hydrologic analysis and design a spillway and discharge channel capable of passing the spillway design flood (50 percent PMF) without overtopping the embankment. The spillway should be protected to prevent erosion.

2. Perform seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams."

3. Extend the riprap zone below the outlet pipe to provide erosion protection, or repair the outlet pipe guillotine so that it does not leak.

4. Repair the spillway so that erosion does not occur downstream of the cut-off wall.

5. Evaluate the feasibility of a warning system to alert downstream residents in the event hazardous conditions develop at the dam during periods of heavy precipitation.

c. **O & M procedures.** It is recommended that a program of periodic inspections and maintenance be developed and implemented without undue delay. This program should include, as a minimum, the measures listed below.

1. Inspect areas subject to erosion such as the spillway and below the outlet pipe.

2. Inspect the dam for evidence of slope instability, such as cracking or slumping of the embankment.

3. Maintain the spillway and discharge channel free of obstructions.

All remedial measures, inspections and maintenance should be performed by or under the guidance of an engineer experienced in the design, construction and maintenance of earth dams.

REFERENCES

Allgood, F. P., and Persinger, I., D., 1979, Missouri General Soil Map and Soil Association Descriptions: US Department of Agriculture, Soil Conservation Service and Missouri Agricultural Experiment Station.

Department of the Army, Office of the Chief of Engineers, 1977, EC 1110-2-188, Engineering and Design National Program of Inspection of Non-Federal Dams.

Department of the Army, Office of the Chief of Engineers, 1979, ER 1110-2-106, Engineering and Design National Program of Inspection of Non-Federal Dams.

Hydrologic Engineering Center, US Army Corps of Engineers, 1978, Flood Hydrograph Package (HEC-1) Users Manual for Dam Safety Investigations.

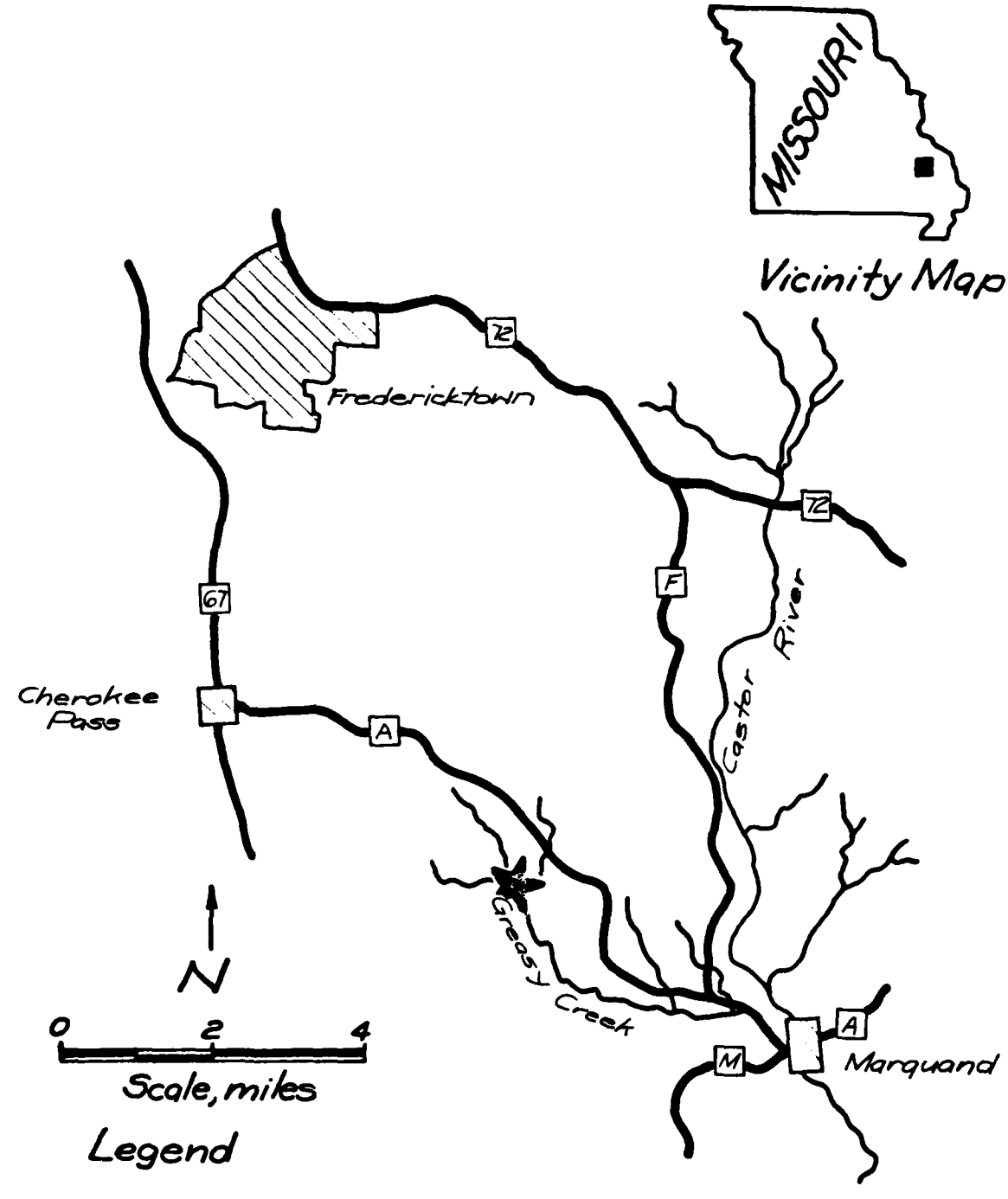
McCracken, M. H., 1971, Structural Features Map of Missouri: Missouri Geological Survey, scale 1:500,000.

Missouri Geological Survey, 1979, Geologic Map of Missouri: Missouri Geological Survey, scale 1:500,000.

St Louis District, US Army Corps of Engineers, 1979, Hydrologic/Hydraulic Standards, Phase I Safety Inspection of Non-Federal Dams.

US Department of Agriculture, Soil Conservation Service, 1971, Hydrology: National Engineering Handbook, Section 4.

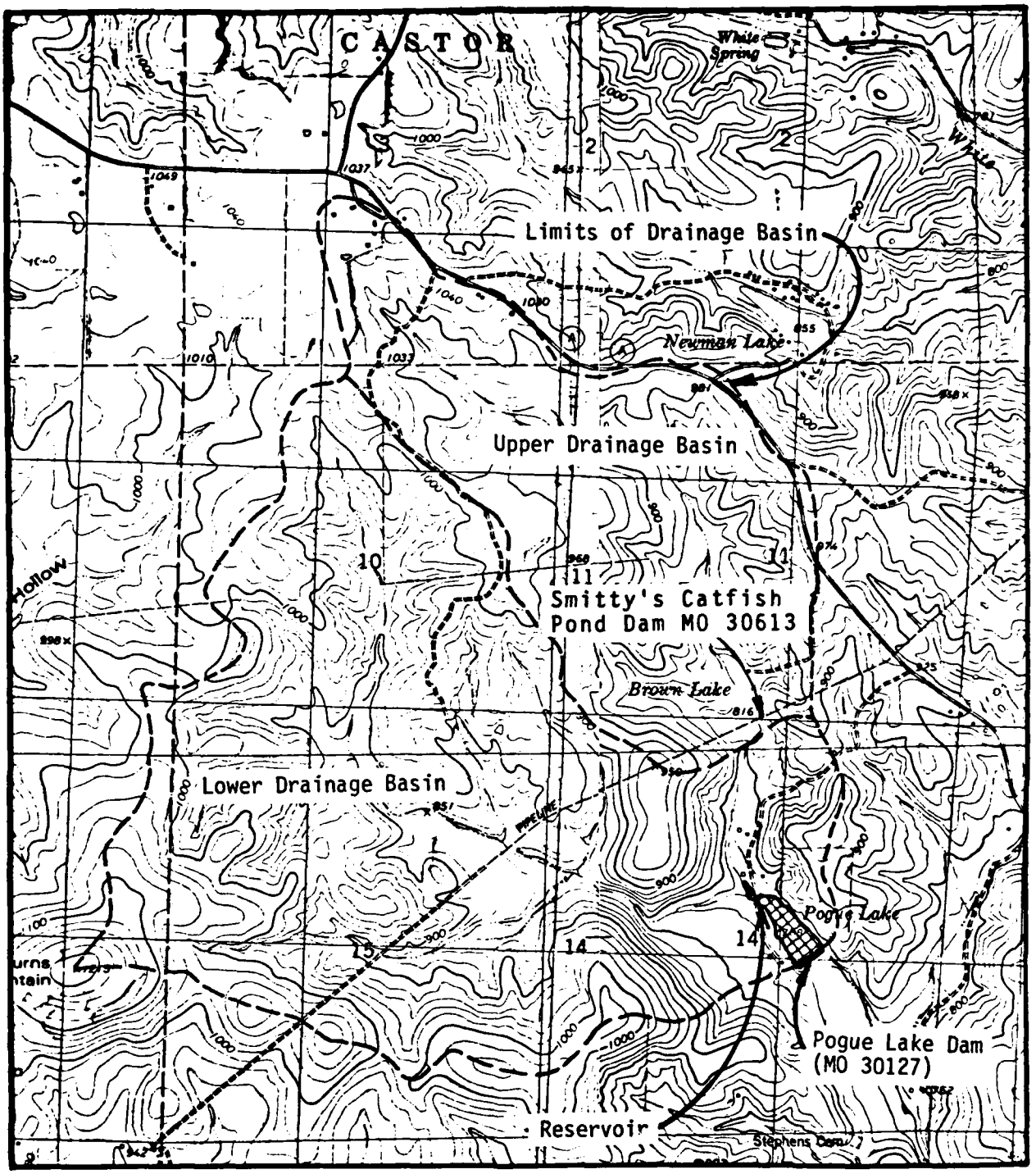
US Department of Commerce, US Weather Bureau, 1956, Seasonal Variation of the Probable Maximum Precipitation East of the 105th Meridian for Areas from 10 to 1,000 Square Miles and Durations of 6, 12, 24 and 48 Hours, Hydrometeorological Report No. 33.



SITE LOCATION MAP

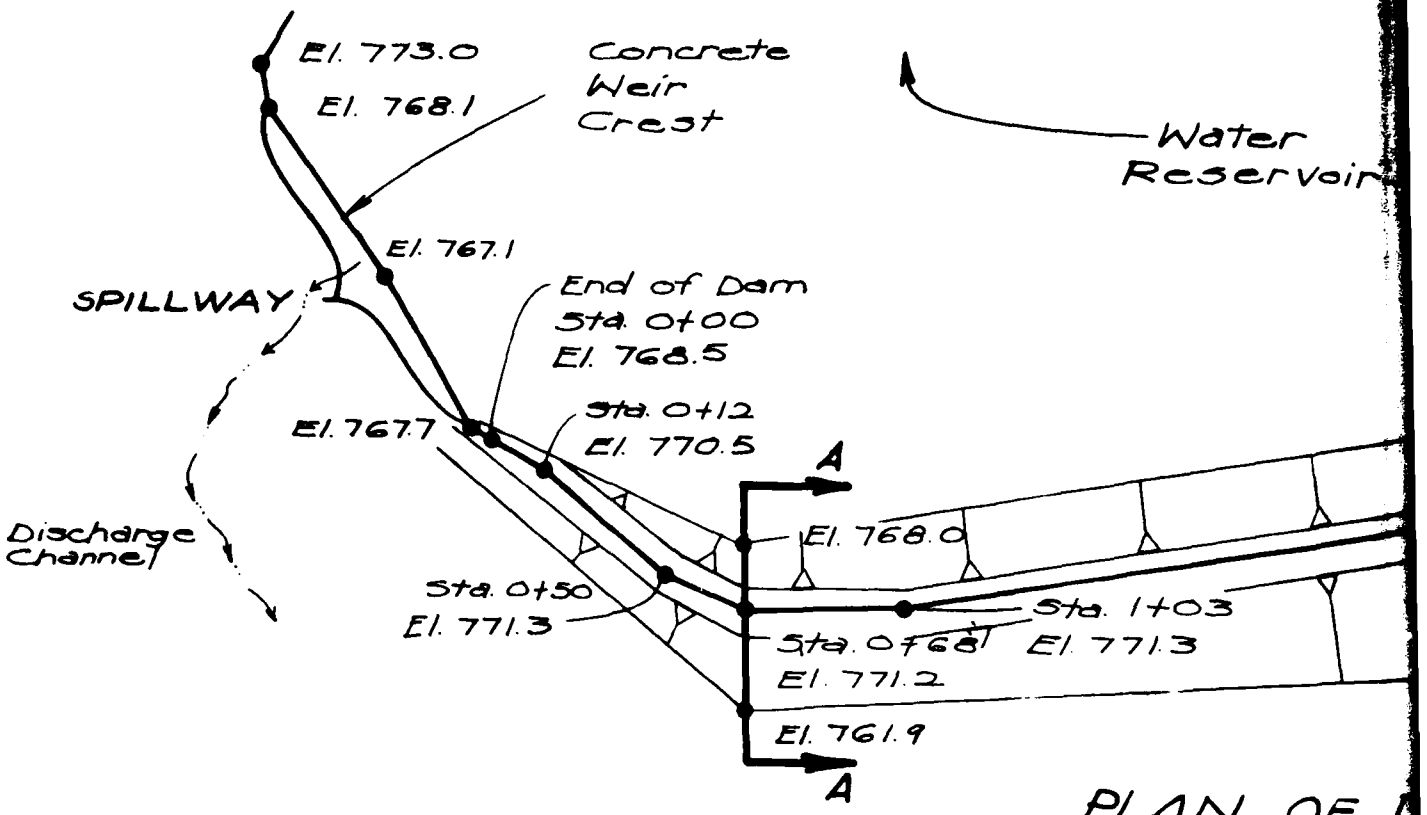
POGUE LAKE DAM

MO 30127 | Fig. 1

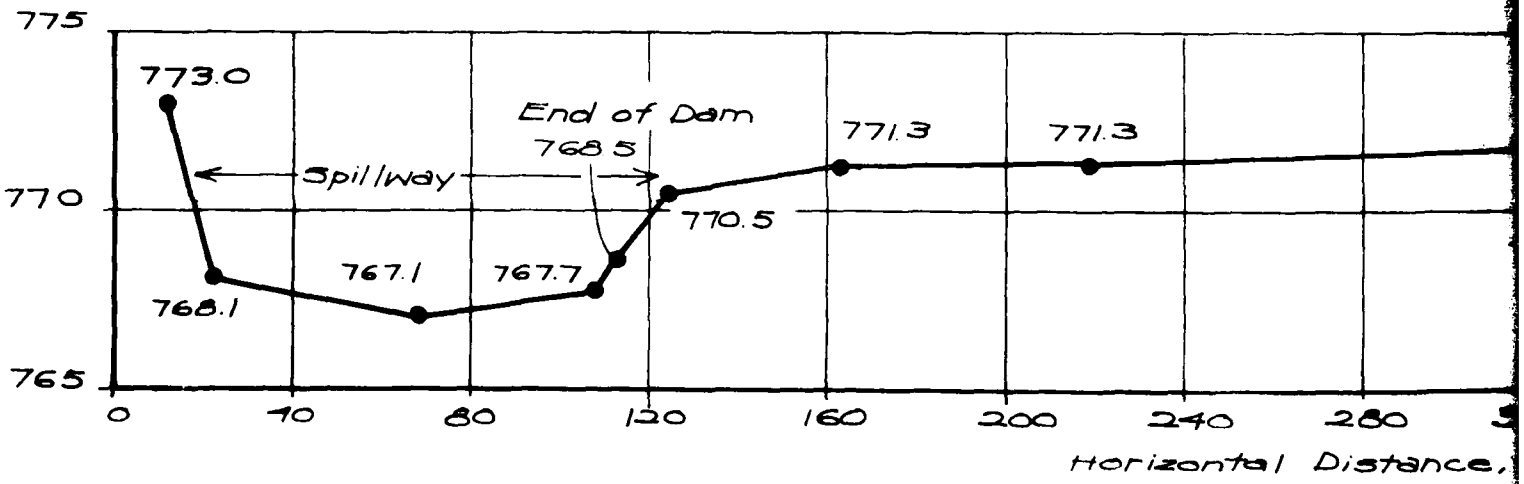


Note: Topography from USGS Marquand (1980) and Cherokee Pass (1980) 7.5-minute quadrangle maps.

DRAINAGE BASIN AND SITE TOPOGRAPHY	
POGUE LAKE DAM	
MO 30127	Fig. 2

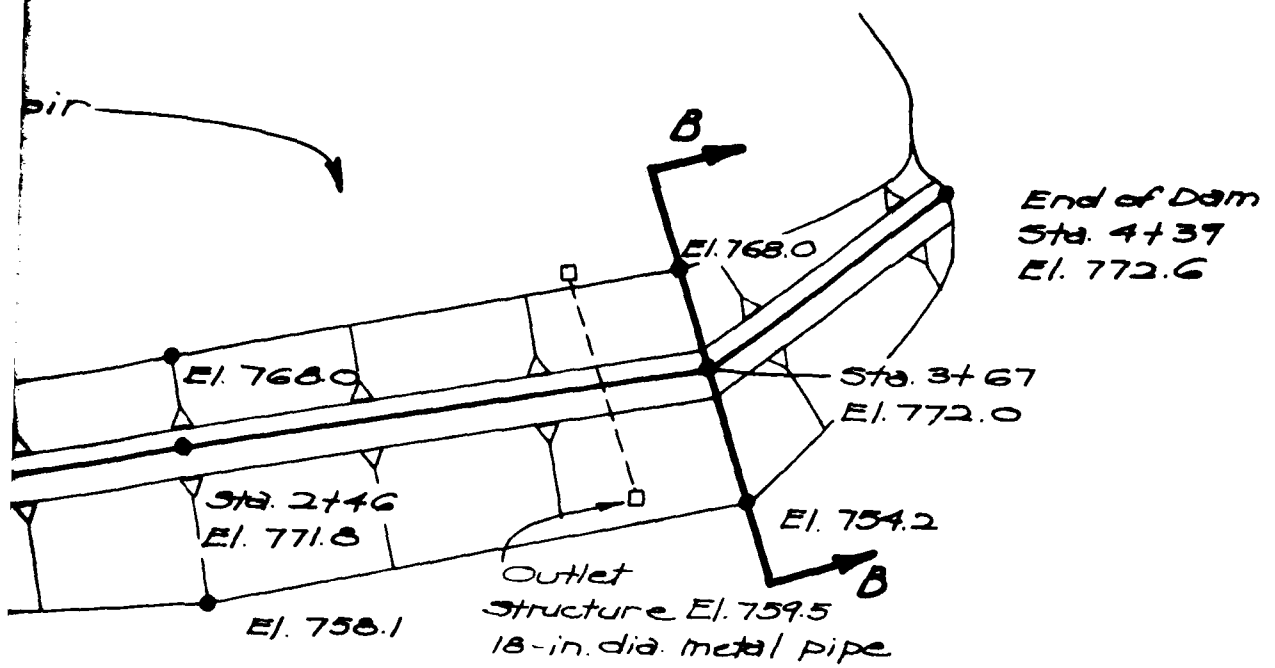


PLAN OF

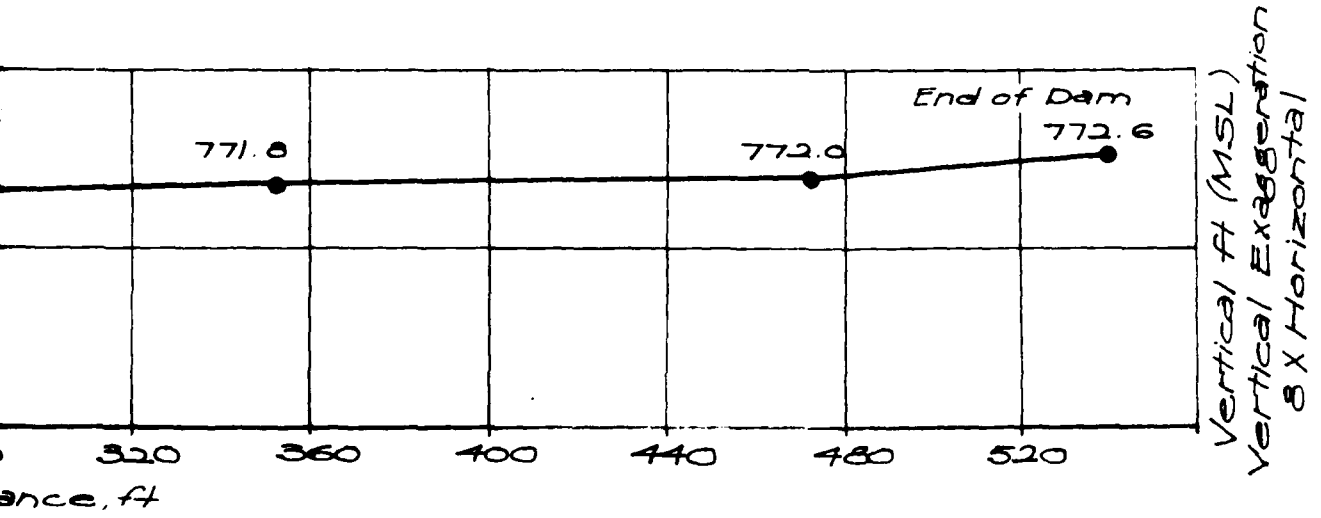


PROFILE OF DAM

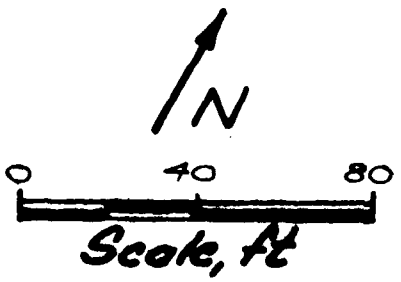
Note:
Surveyed 10 March 1981
by James F. McCaul, III
and Associates, Consulting Engineers / Land Surveyors
Potosi, Missouri.



OF DAM



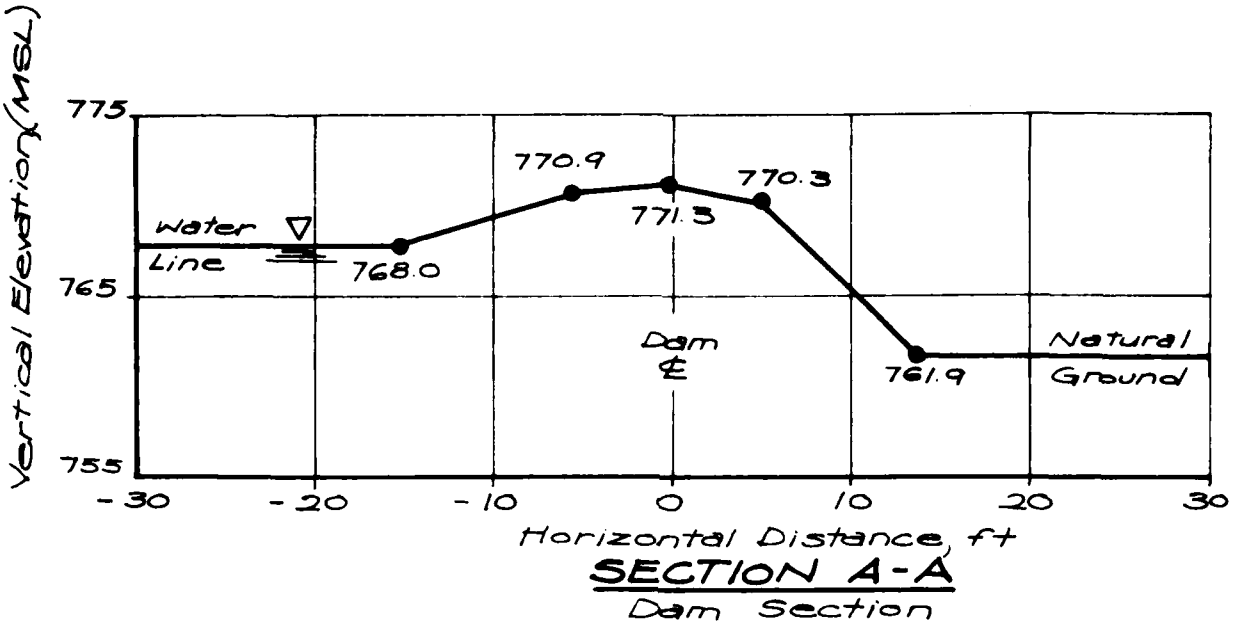
DAM



DAM AND SPILLWAY PLAN AND PROFILE	
POGUE LAKE DAM	
MO 30127	Fig. 8-A

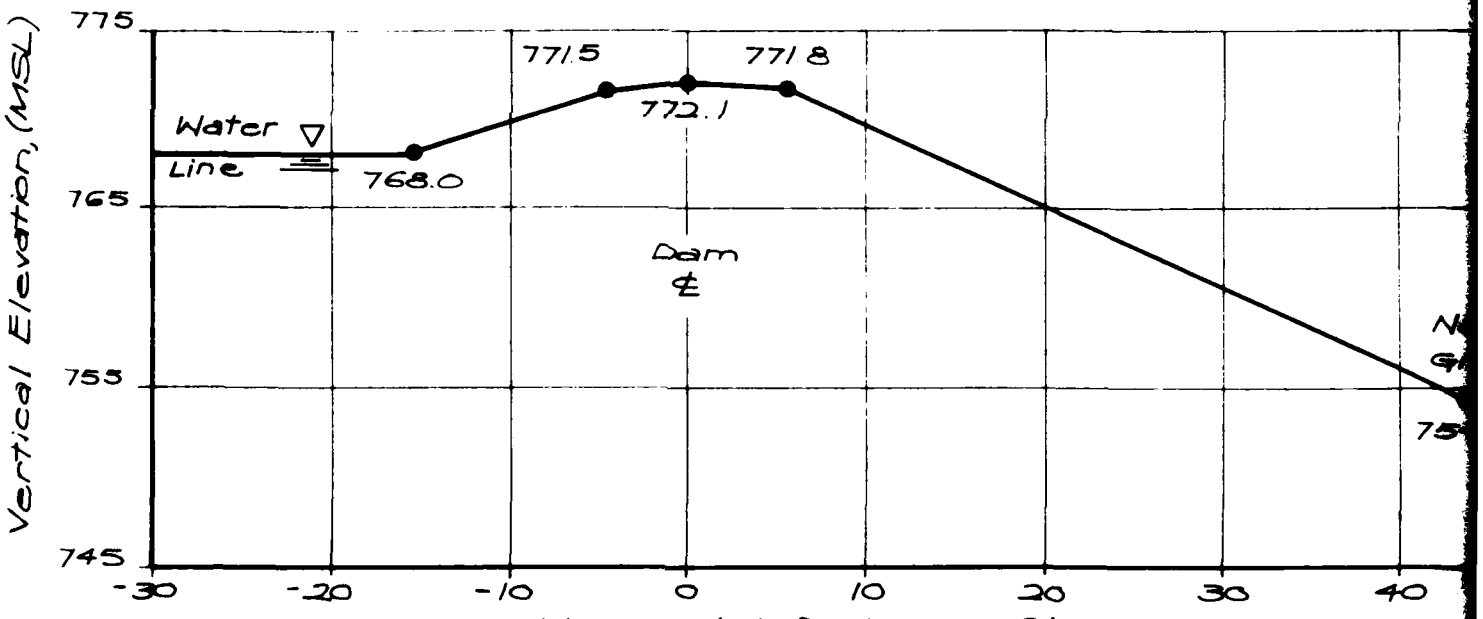
2

1



SECTION A-A

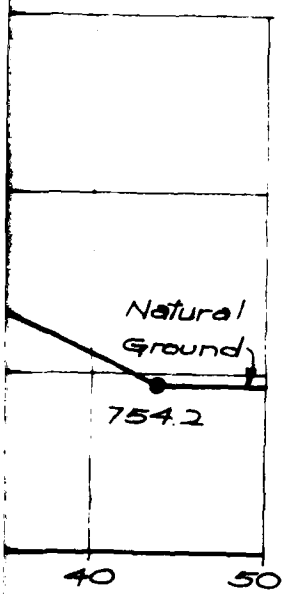
Dam Section



SECTION B-B

Maximum Dam Section

Note:
Surveyed 10 March 1981
by James F. McCaul, III
and Associates, Consulting Engineers/Land Surveyors. Potosi, Mo.



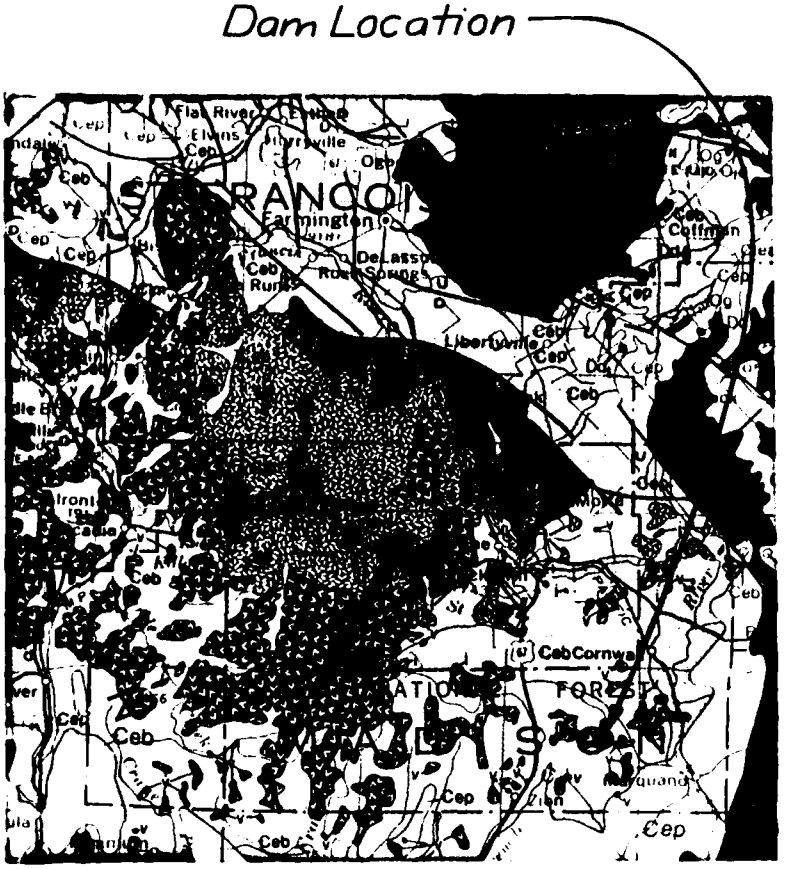
SECTIONS OF DAM

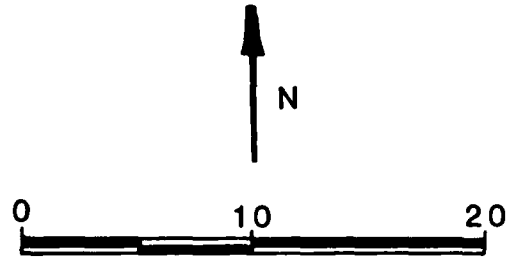
POGUE LAKE DAM

MO 30127 | **Fig. 3-8**

2

1





Legend

- Or — Roubidoux Formation
- Gasconade Dolomite
  - Gunter Sandstone Member
- Cep — Eminence Dolomite
- Potosi Dolomite
- Ceb — Derby-Doerun Dolomite
- Davis Formation
- Bonneterre Formation
  - Whetstone Creek Member
  - Sullivan Siltstone Member
- Reagan Sandstone (subsurface, western Missouri)
- Lamotte Sandstone
- Diabase (dikes and sills)
- St. Francois Mountains Intrusive Suite
- St. Francois Mountains Volcanic Supergroup

REGIONAL GEOLOGIC MAP

POGUE LAKE DAM

MO 30127 | **Fig. 4**

APPENDIX A

Photographs

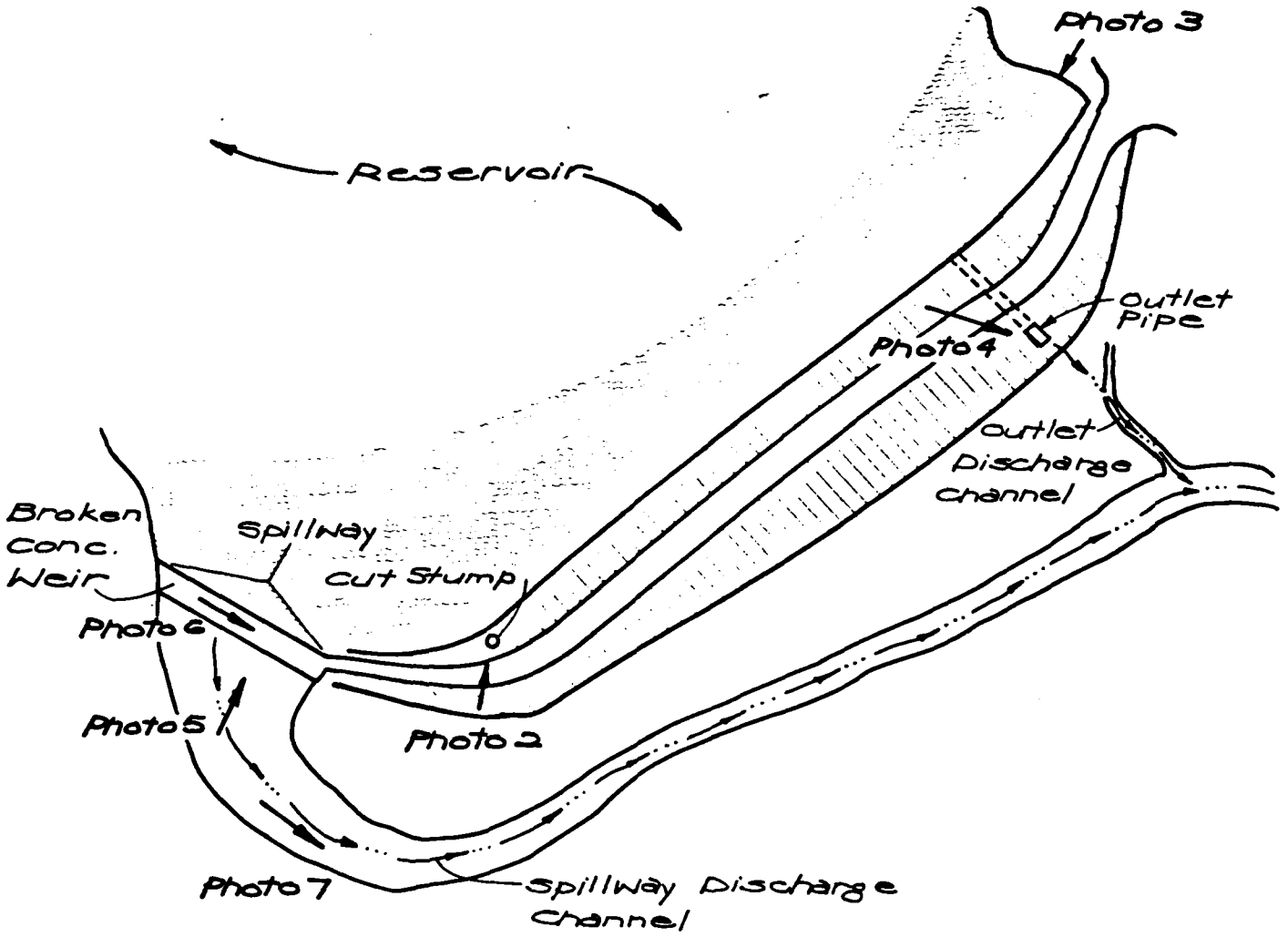


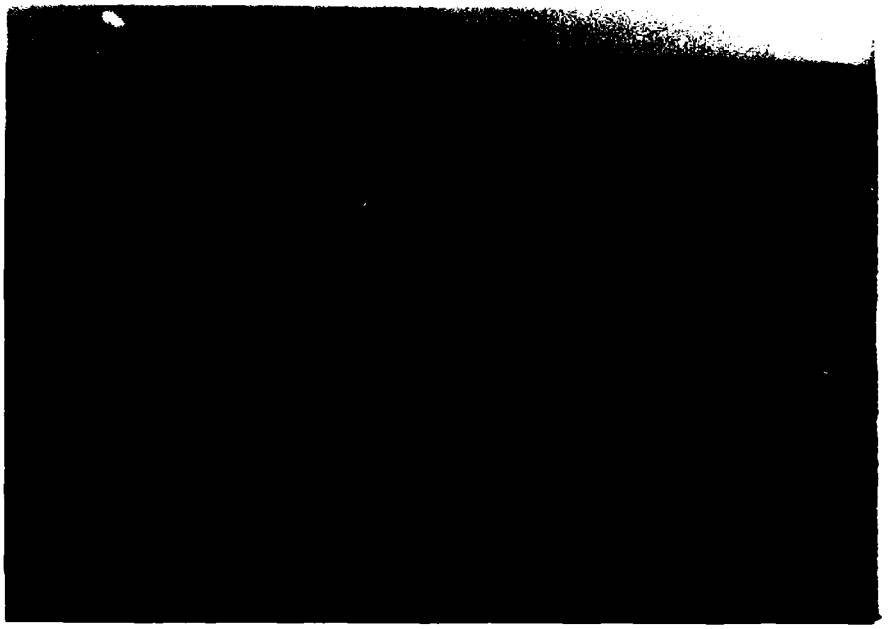
Photo 1 of Downstream Hazard Zone

N

0 67 134

Scale, ft

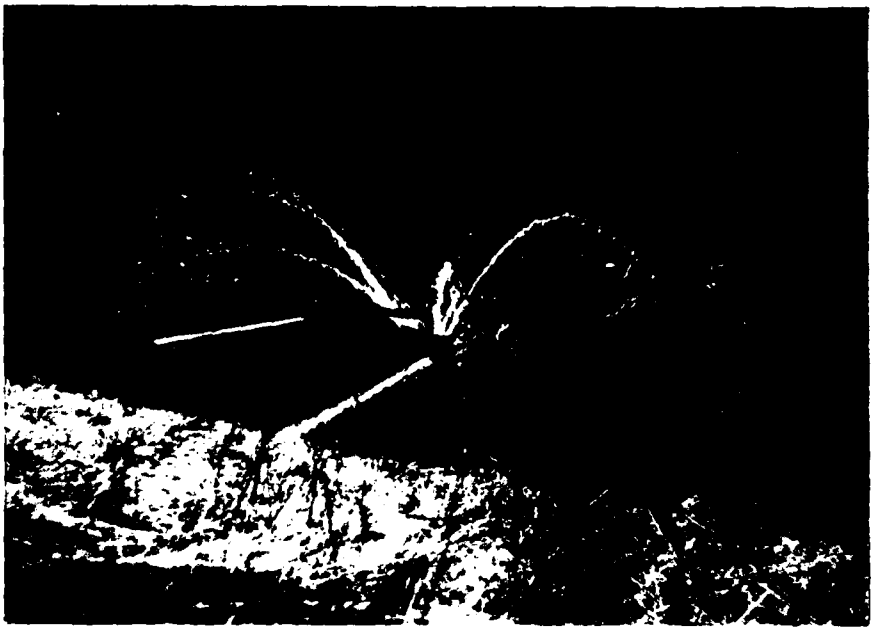
PHOTO LOCATION SKETCH	
POGUE LAKE DAM	
MO 30127	Fig. A-1



1. Hazard zone downstream of Pogue Lake Dam. Looking southeast. Note the dwellings, Missouri Highway A and the town of Marquand in the background.

2. Cut stump on the upstream slope of Pogue Lake Dam. Looking north.

3. Upstream face of Pogue Lake Dam. Looking southwest. Note the small freeboard between the water surface and the dam crest.



4. Downstream end of the low-level pipe. Looking east. Note considerable leakage of the guillotine gate.

5. View of the spillway. Looking northeast. Dam is out of the picture to the right. Note the broken concrete slab and the erosion gullies. Also note that some water is flowing through the spillway.

6. Water flowing over cut-off wall at the spillway. Looking east. Note the cut stump on the upstream face of the dam (right upper corner of the photograph).

7. View of the channel downstream of the spillway. Note the erosion of the right bank of the channel. Also note the bedrock exposed in the channel. Dam is out of picture to the left.

APPENDIX B

Hydraulic/Hydrologic Data and Analyses

APPENDIX B
Hydraulic/Hydrologic Data and Analyses

B.1 Procedures

a. General. The hydraulic/hydrologic analyses were performed using the "HEC-1, Dam Safety Version (1 Apr 80)" computer program. The inflow hydrographs were developed for various precipitation events by applying them to a synthetic unit hydrograph. The inflow hydrographs were subsequently routed through the reservoir and appurtenant structures by the modified Puls reservoir routing option.

b. Precipitation events. The Probable Maximum Precipitation (PMP) and the 1 and 10 percent probability-of-occurrence events were used in the analyses. The total rainfall and corresponding distributions for the 1 and 10 percent probability events were provided by the St. Louis District, Corps of Engineers. The Probable Maximum Precipitation was determined from regional curves prepared by the US Weather Bureau (Hydrometeorological Report Number 33, 1956).

c. Unit hydrograph. The Soil Conservation Services (SCS) Dimensionless Unit Hydrograph method (SCS, 1971, Hydrology: National Engineering Handbook, Section 4) was used in the analysis. This method was selected because of its simplicity, applicability to drainage areas less than 10 mi^2, and its easy availability within the HEC-1 computer program.

The total drainage area was divided in to sub-areas. The data for the upper sub-area are from Smitty's Catfish Pond Dam (MO 30613).

The watershed lag time was computed using the SCS "curve number method" by an empirical relationship as follows:

$$L = \frac{\ell^{0.8}(s+1)^{0.7}}{1900\, Y^{0.5}} \qquad \text{(Equation 15-4)}$$

where: L = lag in hours
ℓ = hydraulic length of the watershed in feet = 11,600 ft (lower); 9100 ft (upper)
$s = \frac{1000}{CN} - 10$ = 4.1 for both lower and upper (for 1 and 10 percent events)
= 1.6 for both lower and upper (for PMF)
CN = hydrologic soil curve number as indicated in Section B.2e.
Y = average watershed land slope in percent = 2.34 (lower); 2.5 (upper).

This empirical relationship accounts for the soil cover, average watershed slope and hydraulic length.

With the lag time thus computed, another empirical relationship is used to compute the time of concentration as follows:

$$T_c = \frac{L}{0.6} \qquad \text{(Equation 15-3)}$$

where: T_c = time of concentration in hours

L = lag in hours.

Subsequent to the computation of the time of concentration, the unit hydrograph duration was estimated utilizing the following relationship:

$$\Delta D = 0.133 T_c \qquad \text{(Equation 16-12)}$$

where: ΔD = duration of unit excess rainfall
T_c = time of concentration in hours.

The final interval was selected to provide at least three discharge ordinates prior to the peak discharge ordinate of the unit hydrograph. For this dam, a time interval of 15 minutes was used.

d. Infiltration losses. The infiltration losses were computed by the HEC-1 computer program internally using the SCS curve number method. The curve numbers were established taking into consideration the variables of: (a) antecedent moisture condition, (b) hydrologic soil group classification, (c) degree of development, (d) vegetative cover and (e) present land usage in the watershed.

Antecedent moisture condition III (AMC III) was used for the PMF events and AMC II was used for the 1 and 10 percent probability events, in accordance with the guidelines. The remaining variables are defined in the SCS procedure and judgements in their selection were made on the basis of visual field inspection.

e. Starting elevations. Reservoir starting water surface elevations for this dam were set as follows:

(1) 1 and 10 percent probability events - spillway crest elevation of 767.1 ft

(2) Probable Maximum Flood - spillway crest elevation of 767.1 ft

Because the outlet pipe has no trash rack, and could easily become obstructed, it was assumed to be inoperative and did not pass any amount of the flood.

f. Spillway Rating Curve. The HEC-2 computer program was used to compute the spillway rating curve using spillway cross section and assuming critical depth over the spillway crest.

B.2 Pertinent Data

a. Drainage area. 2.95 mi^2 (total); 2.0 (lower); 0.95 (upper)

b. Storm duration. A unit hydrograph was developed by the SCS method option of HEC-1 program. The design storm of 48 hours duration was divided into 15 minute intervals in order to develop the inflow hydrograph.

c. Lag time. 1.9 hours (lower); 1.5 hours (upper) (for 1 and 10% events)
1.2 hours (lower); 1.0 hour (upper) (for PMF)

d. Hydrologic soil group. C

e. SCS curve numbers.

1. For PMF- AMC III - Curve Number 86
2. For 1 and 10 percent probability-of-occurrence events - AMC II - Curve Number 71

f. Storage. Elevation-area data were developed by planimetering areas at various elevation contours on the USGS Marquand and Cherokee Pass, Missouri 7.5 minute quadrangle maps. The data were entered on the $A and $E cards so that the HEC-1 program could compute storage volumes.

g. Outflow over dam crest. As the profile of the dam crest is irregular, flow over the crest was computed according to the "Flow Over Non-Level Dam Crest" supplement to the HEC-1 User's Manual. The crest length-elevation data and hydraulic constants were entered on the $D, $L, and $V cards.

h. Outflow capacity. The spillway rating curve was developed from the cross section data of the spillway assuming critical depth over the spillway and using the HEC-2 backwater program. The results of the above were entered on the Y4 and Y5 cards of the HEC-1 program.

i. Reservoir elevations. For the 50 and 100 percent of the PMF events, the starting reservoir elevation was 767.1 ft, the spillway crest elevation. For the 1 and 10 percent probability-of-occurrence events, the starting reservoir elevation was also 767.1 ft, the spillway crest elevation.

B.3 Results

The results of the analyses as well as the input values to the HEC-1 program follow in this Appendix. Only the results summaries are included and not the intermediate output. Complete copies of the HEC-1 output are available in the project files.

```
**********
HEC-1 FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION  JULY 1978
LAST MODIFICATION  01 APR 80
**********
     1  A1    POGUE LAKE DAM, MO. 30127, MADISON COUNTY, MISSOURI
     2  A2    WOODWARD-CLYDE CONSULTANTS, HOUSTON JOB 80C224-T100.
     3  A3    PROBABLE MAXIMUM FLOOD (PMF) ANALYSIS
     4  B   192    0    15    0    0    0    0    0    0    0
     5  B1   5
     6  J    1    2    1
     7  J1  .50  1.0
     8  K    0  POND                              3    1
     9  K1    SMITTYS CATFISH POND FLOOD HYDROGRAPH
    10  M     1    2  0.95                        1.0
    11  P     0   26   102   120   130   140
    12  T                                        -1   -86          0.02
    13  W2       1.53
    14  X    -1  -.05    5
    15  K     1  DAM                             3    1
    16  K1    FLOOD ROUTING AND OVERTOPPING ANALYSES (SMITTYS POND)
    17  Y                                   1    1
    18  Y1    1                                      -815.8   -1
    19  Y4 815.8  816.2  816.4  816.7  816.8  817.3  817.7  818.6  819.9  822.7
    20  Y4 824.8  826.  826.6
    21  Y5   0.   20.   40.  100.  150.  300.  500. 1000. 2000. 5000.
    22  Y5 8000. 10000. 15000.
    23  SA   0.  2.2  10.  19.  23.
    24  SE 800.  810.  816.  820.  830.
    25  SS 815.8
    26  SD 818.4  2.7  1.5
    27  SL   0.  130.  170.  220.  225.  235.
    28  SV 818.4 818.7  819.  820.  821.  823.
    29  K    0  INFLOW                          1
    30  K1    PMF HYDROGRAPH ANALYSIS
    31  M     1    2  2.0                        1.0
    32  P     0   26   102   120   130   140
    33  T                                        -1   -86          .01
    34  W2       1.9
    35  X    -1  -.05    5
    36  K     2  LAKE                            1
    37  K1    COMBINE FLOW WITH THE OUT FLOW FROM SMITTYS CATFISH POND
    38  K     1  DAM                             1
    39  K1    FLOOD ROUTING AND OVERTOPPING ANALYSES
    40  Y                                   1    1
    41  Y1    1                                      -767.1   -1
    42  Y4 767.1  767.8  768.0  769.0  769.8  771.1  772.1  773.0  773.9  774.6
    43  Y5   0.  50.0  100.0  500.0 1000.0 2000.0 3000.0 4000.0 5000.0 6000.0
    44  SA   4.7  8.1  10.0  29.0
    45  SE 760.0  768.0  770.0  780.0
    46  SS 767.1
    47  SD 770.5  2.8  1.5
    48  SL   0.  38.2  56.3  90.9 233.4 355.2 426.5 450.0 471.3
    49  SV 770.5 771.3 771.3 771.4 771.8 772.1 772.6 774.0 782.9
    50  K   99
```

Input Data
Various PMF Events
Pogue Lake Dam
MO 31027
B4

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	26.00	102.00	120.00	130.00	140.00	0.00	0.00

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	-1.00	-86.00	0.00	.01

CURVE NO = -86.00 WETNESS = -1.00 EFFECT CN = 86.00

UNIT HYDROGRAPH DATA

TC= 0.00 LAG= 1.90

RECESSION DATA

STRTQ= -1.00 QRCSN= -.05 RTIOR= 5.00

UNIT HYDROGRAPH 40 END OF PERIOD ORDINATES, TC= 0.00 HOURS, LAG= 1.90 VOL= 1.00

22.	68.	131.	220.	328.	413.	462.	478.	469.	432.
388.	333.	265.	210.	171.	139.	116.	96.	78.	64.
52.	43.	35.	28.	23.	19.	16.	13.	10.	9.
7.	6.	5.	4.	3.	3.	2.	1.	1.	0.

0 END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.15	1	.00	.00	.00	2.	1.02	.15	97	.04	.04	.01	27.
1.01	.30	2	.00	.00	.00	1.	1.02	.30	98	.04	.04	.01	29.
1.01	.45	3	.00	.00	.00	1.	1.02	.45	99	.04	.04	.01	32.
1.01	1.00	4	.00	.00	.00	1.	1.02	1.00	100	.04	.04	.01	38.
1.01	1.15	5	.00	.00	.00	1.	1.02	1.15	101	.04	.04	.01	48.
1.01	1.30	6	.00	.00	.00	1.	1.02	1.30	102	.04	.04	.01	61.
1.01	1.45	7	.00	.00	.00	1.	1.02	1.45	103	.04	.04	.01	75.
1.01	2.00	8	.00	.00	.00	1.	1.02	2.00	104	.04	.04	.01	90.
1.01	2.15	9	.00	.00	.00	1.	1.02	2.15	105	.04	.04	.01	105.
1.01	2.30	10	.00	.00	.00	1.	1.02	2.30	106	.04	.04	.01	119.
1.01	2.45	11	.00	.00	.00	0.	1.02	2.45	107	.04	.04	.01	132.
1.01	3.00	12	.00	.00	.00	0.	1.02	3.00	108	.04	.04	.01	143.
1.01	3.15	13	.00	.00	.00	0.	1.02	3.15	109	.04	.04	.01	152.
1.01	3.30	14	.00	.00	.00	0.	1.02	3.30	110	.04	.04	.01	159.
1.01	3.45	15	.00	.00	.00	0.	1.02	3.45	111	.04	.04	.01	165.
1.01	4.00	16	.00	.00	.00	0.	1.02	4.00	112	.04	.04	.01	170.
1.01	4.15	17	.00	.00	.00	0.	1.02	4.15	113	.04	.04	.01	174.
1.01	4.30	18	.00	.00	.00	0.	1.02	4.30	114	.04	.04	.01	178.
1.01	4.45	19	.00	.00	.00	0.	1.02	4.45	115	.04	.04	.01	181.
1.01	5.00	20	.00	.00	.00	0.	1.02	5.00	116	.04	.04	.01	183.
1.01	5.15	21	.00	.00	.00	0.	1.02	5.15	117	.04	.04	.00	186.
1.01	5.30	22	.00	.00	.00	0.	1.02	5.30	118	.04	.04	.00	188.
1.01	5.45	23	.00	.00	.00	0.	1.02	5.45	119	.04	.04	.00	189.
1.01	6.00	24	.00	.00	.00	0.	1.02	6.00	120	.04	.04	.00	191.
1.01	6.15	25	.02	.00	.01	0.	1.02	6.15	121	.20	.17	.02	195.
1.01	6.30	26	.02	.00	.01	0.	1.02	6.30	122	.20	.18	.02	209.
1.01	6.45	27	.02	.00	.01	0.	1.02	6.45	123	.20	.18	.02	224.
1.01	7.00	28	.02	.00	.01	0.	1.02	7.00	124	.20	.18	.02	255.
1.01	7.15	29	.02	.00	.01	0.	1.02	7.15	125	.20	.18	.02	301.
1.01	7.30	30	.02	.00	.01	0.	1.02	7.30	126	.20	.18	.01	359.
1.01	7.45	31	.02	.00	.01	0.	1.02	7.45	127	.20	.18	.01	424.
1.01	8.00	32	.02	.00	.01	0.	1.02	8.00	128	.20	.18	.01	492.
1.01	8.15	33	.02	.00	.01	0.	1.02	8.15	129	.20	.18	.01	559.
1.01	8.30	34	.02	.00	.01	1.	1.02	8.30	130	.20	.18	.01	621.

Output Summary
Various PMF Events
Pogue Lake Dam
MO 30127
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1.01	8.45	35	.02	.00	.01	1.	1.02	8.45	131	.20	.18	.01	677.
1.01	9.00	36	.02	.00	.01	1.	1.02	9.00	132	.20	.19	.01	726.
1.01	9.15	37	.02	.00	.01	1.	1.02	9.15	133	.20	.19	.01	766.
1.01	9.30	38	.02	.00	.01	1.	1.02	9.30	134	.20	.19	.01	799.
1.01	9.45	39	.02	.00	.01	1.	1.02	9.45	135	.20	.19	.01	826.
1.01	10.00	40	.02	.00	.01	1.	1.02	10.00	136	.20	.19	.01	849.
1.01	10.15	41	.02	.00	.01	1.	1.02	10.15	137	.20	.19	.01	869.
1.01	10.30	42	.02	.00	.01	1.	1.02	10.30	138	.20	.19	.01	885.
1.01	10.45	43	.02	.00	.01	1.	1.02	10.45	139	.20	.19	.01	898.
1.01	11.00	44	.02	.00	.01	1.	1.02	11.00	140	.20	.19	.01	910.
1.01	11.15	45	.02	.00	.01	1.	1.02	11.15	141	.20	.19	.01	920.
1.01	11.30	46	.02	.00	.01	1.	1.02	11.30	142	.20	.19	.01	929.
1.01	11.45	47	.02	.00	.01	2.	1.02	11.45	143	.20	.19	.01	936.
1.01	12.00	48	.02	.00	.01	2.	1.02	12.00	144	.20	.19	.01	942.
1.01	12.15	49	.05	.01	.04	3.	1.02	12.15	145	.66	.65	.02	958.
1.01	12.30	50	.05	.01	.04	4.	1.02	12.30	146	.66	.65	.02	994.
1.01	12.45	51	.05	.01	.04	6.	1.02	12.45	147	.66	.65	.01	1058.
1.01	13.00	52	.05	.01	.04	8.	1.02	13.00	148	.66	.65	.01	1162.
1.01	13.15	53	.06	.02	.04	12.	1.02	13.15	149	.80	.78	.01	1318.
1.01	13.30	54	.06	.02	.04	17.	1.02	13.30	150	.80	.78	.01	1519.
1.01	13.45	55	.06	.02	.04	24.	1.02	13.45	151	.80	.79	.01	1751.
1.01	14.00	56	.06	.03	.03	32.	1.02	14.00	152	.80	.79	.01	2002.
1.01	14.15	57	.08	.04	.04	41.	1.02	14.15	153	.99	.98	.01	2269.
1.01	14.30	58	.08	.04	.04	52.	1.02	14.30	154	.99	.99	.01	2537.
1.01	14.45	59	.08	.04	.04	64.	1.02	14.45	155	.99	.99	.01	2806.
1.01	15.00	60	.08	.04	.03	77.	1.02	15.00	156	.99	.99	.01	3069.
1.01	15.15	61	.08	.05	.03	91.	1.02	15.15	157	1.01	1.00	.01	3322.
1.01	15.30	62	.16	.10	.06	107.	1.02	15.30	158	2.02	2.00	.01	3564.
1.01	15.45	63	.43	.30	.13	130.	1.02	15.45	159	5.64	5.62	.02	3959.
1.01	16.00	64	.11	.08	.03	160.	1.02	16.00	160	1.41	1.41	.00	4451.
1.01	16.15	65	.07	.05	.02	197.	1.02	16.15	161	.93	.93	.00	5030.
1.01	16.30	66	.07	.05	.02	242.	1.02	16.30	162	.93	.93	.00	5742.
1.01	16.45	67	.07	.06	.02	290.	1.02	16.45	163	.93	.93	.00	6499.
1.01	17.00	68	.07	.06	.02	331.	1.02	17.00	164	.93	.93	.00	7009.
1.01	17.15	69	.06	.04	.01	359.	1.02	17.15	165	.73	.73	.00	7437.
1.01	17.30	70	.06	.05	.01	375.	1.02	17.30	166	.73	.73	.00	7553.
1.01	17.45	71	.06	.05	.01	381.	1.02	17.45	167	.73	.73	.00	7494.
1.01	18.00	72	.06	.05	.01	376.	1.02	18.00	168	.73	.73	.00	7251.
1.01	18.15	73	.01	.00	.00	365.	1.02	18.15	169	.07	.06	.00	6908.
1.01	18.30	74	.01	.00	.00	347.	1.02	18.30	170	.07	.06	.00	6446.
1.01	18.45	75	.01	.00	.00	321.	1.02	18.45	171	.07	.06	.00	5875.
1.01	19.00	76	.01	.00	.00	294.	1.02	19.00	172	.07	.06	.00	5315.
1.01	19.15	77	.01	.00	.00	267.	1.02	19.15	173	.07	.06	.00	4772.
1.01	19.30	78	.01	.00	.00	239.	1.02	19.30	174	.07	.06	.00	4229.
1.01	19.45	79	.01	.00	.00	211.	1.02	19.45	175	.07	.06	.00	3709.
1.01	20.00	80	.01	.00	.00	183.	1.02	20.00	176	.07	.06	.00	3200.
1.01	20.15	81	.01	.00	.00	157.	1.02	20.15	177	.07	.06	.00	2733.
1.01	20.30	82	.01	.00	.00	134.	1.02	20.30	178	.07	.06	.00	2320.
1.01	20.45	83	.01	.00	.00	113.	1.02	20.45	179	.07	.06	.00	1960.
1.01	21.00	84	.01	.00	.00	96.	1.02	21.00	180	.07	.06	.00	1657.
1.01	21.15	85	.01	.00	.00	82.	1.02	21.15	181	.07	.06	.00	1411.
1.01	21.30	86	.01	.00	.00	71.	1.02	21.30	182	.07	.06	.00	1219.
1.01	21.45	87	.01	.00	.00	62.	1.02	21.45	183	.07	.06	.00	1055.
1.01	22.00	88	.01	.00	.00	55.	1.02	22.00	184	.07	.06	.00	925.
1.01	22.15	89	.01	.00	.00	49.	1.02	22.15	185	.07	.06	.00	818.
1.01	22.30	90	.01	.00	.00	44.	1.02	22.30	186	.07	.06	.00	729.
1.01	22.45	91	.01	.00	.00	39.	1.02	22.45	187	.07	.06	.00	656.
1.01	23.00	92	.01	.00	.00	36.	1.02	23.00	188	.07	.06	.00	597.
1.01	23.15	93	.01	.00	.00	33.	1.02	23.15	189	.07	.06	.00	548.
1.01	23.30	94	.01	.00	.00	31.	1.02	23.30	190	.07	.06	.00	506.

Output Summary
Various PMF Events
Pogue Lake Dam
MO 30127
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1.	23.30	94	.01	.00	.00	31.	1.02	23.30	190	.07	.06	.00	509.

1.01	23.45	95	.01	.00	.00	29.	1.02	23.45	191	.07	.06	.00	479.
1.02	0.00	96	.01	.00	.00	28.	1.03	0.00	192	.07	.06	.00	451.
									SUM	36.40	34.54	1.86	174845.
										(925.1(	877.1(	47.1(	4945.40)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	7993.	5038.	1747.	908.	174419.
CMS	214.	143.	49.	26.	4939.
INCHES		23.43	32.51	33.80	33.80
MM		595.16	825.70	858.57	858.57
AC-FT		2498.	3466.	3604.	3604.
THOUS CU M		3081.	4275.	4445.	4445.

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 1

1.	1.	1.	1.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	1.	1.	1.	1.	2.
3.	4.	6.	9.	12.	16.	21.	26.	32.	38.
45.	53.	65.	80.	99.	121.	145.	165.	180.	187.
190.	188.	183.	173.	161.	147.	134.	119.	105.	91.
78.	67.	57.	48.	41.	36.	31.	27.	24.	22.
20.	18.	17.	16.	15.	14.	14.	14.	16.	19.
24.	30.	38.	45.	53.	60.	66.	71.	76.	79.
82.	85.	87.	89.	90.	92.	93.	94.	95.	95.
98.	103.	112.	128.	151.	180.	212.	246.	279.	310.
339.	363.	383.	399.	413.	424.	434.	442.	449.	455.
460.	464.	468.	471.	479.	497.	529.	581.	659.	759.
875.	1001.	1134.	1269.	1403.	1535.	1661.	1792.	1980.	2226.
2519.	2871.	3249.	3544.	3718.	3777.	3747.	3626.	3454.	3223.
2958.	2658.	2386.	2114.	1853.	1600.	1366.	1160.	980.	828.
706.	607.	528.	462.	409.	364.	328.	298.	274.	254.
239.	226.								

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3777.	2519.	874.	454.	87209.
CMS	107.	71.	25.	13.	2469.
INCHES		11.72	16.25	16.90	16.90
MM		297.58	412.85	429.29	429.29
AC-FT		1249.	1733.	1802.	1802.
THOUS CU M		1541.	2137.	2223.	2223.

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 2

2.	1.	1.	1.	1.	1.	1.	1.	1.	1.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	2.	2.	3.	4.
6.	8.	12.	17.	24.	32.	41.	52.	64.	77.
91.	107.	130.	160.	197.	242.	290.	331.	359.	375.
381.	376.	365.	347.	321.	294.	267.	239.	211.	183.
157.	134.	113.	96.	82.	71.	62.	55.	49.	44.

Output Summary
Various PMF Events
Pogue Lake Dam
MO 30127
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PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 .50	RATIO 2 1.00
HYDROGRAPH AT	POND	.95	1	1970.	3939.
		(2.46)	(	55.77)(	111.55)(
ROUTED TO	DAM	.95	1	1970.	3948.
		(2.46)	(	55.78)(	111.80)(
HYDROGRAPH AT	INFLOW	2.00	1	3777.	7553.
		(5.18)	(	106.94)(	213.88)(
2 COMBINED	LAKE	2.95	1	5713.	11412.
		(7.64)	(	161.78)(	323.15)(
ROUTED TO	DAM	2.95	1	5720.	11428.
		(7.64)	(	161.96)(	323.61)(

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1		INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	ELEVATION	767.10	767.10	770.50
	STORAGE	43.	43.	74.
	OUTFLOW	0.	0.	1938.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.50	772.93	2.43	103.	5720.	6.50	41.50	0.00
1.00	774.36	3.86	124.	11428.	9.00	41.50	0.00

Output Summary
Various PMF Events
Pogue Lake Dam
MO 30127
B8

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS				
				RATIO 1 .12	RATIO 2 .13	RATIO 3 .14	RATIO 4 .15	RATIO 5 .16
HYDROGRAPH AT	POND	.95	1	473.	512.	552.	591.	630.
		2.46)	(	13.39)(	14.50)(	15.62)(	16.73)(	17.85)(
ROUTED TO	DAM	.95	1	462.	500.	540.	579.	617.
		2.46)	(	13.07)(	14.16)(	15.29)(	16.39)(	17.48)(
HYDROGRAPH AT	INFLOW	2.00	1	906.	982.	1057.	1133.	1209.
		5.18)	(	25.67)(	27.80)(	29.94)(	32.08)(	34.22)(
2 COMBINED	LAKE	2.95	1	1368.	1482.	1597.	1712.	1826.
		7.64)	(	38.73)(	41.97)(	45.23)(	48.47)(	51.70)(
ROUTED TO	DAM	2.95	1	1358.	1471.	1585.	1699.	1812.
		7.64)	(	38.46)(	41.66)(	44.88)(	48.10)(	51.31)(

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	767.10	767.10	770.50
STORAGE	43.	43.	74.
OUTFLOW	0.	0.	1530.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.12	770.27	0.00	71.	1358.	0.00	41.75	0.00
.13	770.41	0.00	73.	1471.	0.00	41.75	0.00
.14	770.56	.06	74.	1585.	.75	41.75	0.00
.15	770.71	.21	76.	1699.	1.25	41.75	0.00
.16	770.85	.35	78.	1812.	1.75	41.75	0.00

Output Summary
Various PMF Events
Pogue Lake Dam
MO 30127
B9

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**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION  JULY 1978
 LAST MODIFICATION  01 APR 80
**********
     1            A1      POGUE LAKE DAM, NO. 30127, MADISON COUNTY, MISSOURI
     2            A2        WOODWARD-CLYDE CONSULTANTS, HOUSTON JOB 80C224-T100.
     3            A3       PROBABILISTIC FLOOD - 100-YEAR
     4            B   192     0     15      0       0       0       0       0       0       0
     5            B1    5
     6            K     0    POND                                    3       1
     7            K1       SMITTYS CATFISH POND FLOOD HYDROGRAPH
     8            N        0       2     0.99                              1.0
     9            B   192  8.838                    DA =   5.00
    10            B1  .016    .016    .016    .016    .016    .016    .016    .016    .016    .016
    11            B1  .016    .016    .016    .016    .016    .016    .016    .016    .016    .016
    12            B1  .016    .016    .016    .016    .016    .016    .016    .016    .016    .016
    13            B1  .016    .016    .016    .016    .016    .016    .016    .016    .016    .016
    14            B1  .016    .016    .016    .016    .016    .016    .016    .016    .016    .016
    15            B1  .016    .016    .016    .016    .016    .016    .016    .016    .016    .016
    16            B1  .016    .016    .016    .016    .016    .016    .016    .016    .016    .016
    17            B1  .016    .016    .016    .016    .016    .016    .016    .016    .016    .016
    18            B1  .016    .016    .016    .016    .016    .016    .016    .016    .016    .016
    19            B1  .016    .016    .016    .016    .016    .016    .021    .021    .021    .021
    20            B1  .021    .021    .021    .021    .021    .021    .021    .021    .021    .021
    21            B1  .021    .021    .021    .021    .021    .021    .021    .021    .021    .021
    22            B1  .041    .041    .041    .041    .042    .042    .042    .042    .042    .042
    23            B1  .042    .042    .042    .042    .042    .042    .042    .042    .042    .042
    24            B1  .042    .041    .041    .041    .075    .076    .076    .076    .076    .076
    25            B1  .102    .102    .178    .180    .424    .769   1.685    .431    .181    .179
    26            B1  .102    .102    .076    .076    .076    .076    .076    .076    .021    .021
    27            B1  .021    .021    .021    .021    .021    .021    .021    .021    .021    .021
    28            B1  .021    .021    .021    .021    .021    .021    .021    .021    .021    .021
    29            B1  .021    .021
    30            T                                                   -1      -71             0.02
    31            W2          1.53
    32            K     -1     .05
    33            K      1    DAM                                     3       1
    34            K1       FLOOD ROUTING AND OVERTOPPING ANALYSES (SMITTYS POND)
    35            V                                       1
    36            Y1     1                                                -815.8      -1
    37            Y4 815.8   816.2   816.4   816.7   816.8   817.3   817.7   818.6   819.9   822.7
    38            Y4 824.8   826.    826.6
    39            Y5   0.     20.     40.    100.    150.    300.    500.   1000.   2000.   5000.
    40            Y5 8000.  10000.  15000.
    41            SA   0.    2.2     10.     15.     23.
    42            SE  800.    810.    816.    820.    830.
    43            SS 815.8
    44            SD 818.4    2.7     1.9
    45            SL   0.    130.    170.    220.    225.    235.
    46            SV 818.4   818.7   819.    820.    821.    823.
    47            K      0  INFLOW                                   1
    48            K1 RAIN STA. 18=LESTERVILLE, FREQ=  1.0, INTERVAL=15.0 MIN., DURATION= 48 HRS.
    49            M        0       2     2.0                               1.0
    50            B   -192
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Input Data
12 Probability Event
Pogue Lake Dam
MO 30127
B10

Input Data
1% Probability Event
Pogue Lake Dam
MO 30127
B11

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T                                                               -1      -71            .01
W2             1.9
X      -1     -.05        5
K       2     LAKE                                               1
K1       COMBINE FLOW WITH THE OUT FLOW FROM SMITTYS CATFISH POND
K       1       DAM                                              1
K1       FLOOD ROUTING AND OVERTOPPING ANALYSES
Y                                        1
Y1      1                                                   -767.1       -1
Y4 767.1     767.8     768.0     769.0     769.8     771.1     772.1     773.0     773.9     774.6
Y5    0.      50.0     100.0     500.0    1000.0    2000.0    3000.0    4000.0    5000.0    6000.0
SA   4.7       8.1      10.0      25.0
SE 760.0     768.0     770.0     780.0
SS 767.1
SD 770.5       2.8       1.5
SL    0.      38.2      56.3      90.9     233.4     399.2     426.5     450.0     471.3
SV 770.5     771.3     771.3     771.4     771.8     772.1     772.6     774.0     782.9
K     99
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*************************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION       JULY 1978
  LAST MODIFICATION  01 APR 80
*************************************

RUN  DATE= 81/03/27.
     TIME= 06.37.40.


                  POGUE LAKE DAM, NO. 30127, MADISON COUNTY, MISSOURI
                  WOODWARD-CLYDE CONSULTANTS, HOUSTON JOB 80C224-T100.
                  PROBABILISTIC FLOOD - 100-YEAR

                                  JOB SPECIFICATION
              NO     NHR     NMIN    IDAY     IHR     IMIN    METRC     IPLT     IPRT    NSTAN
             192       0       15       0       0        0        0        0        0        0
                                    JOPER     NWT    LROPT    TRACE
                                        3       0        0        0


           *********       *********       *********       *********       *********

                              SUB-AREA RUNOFF COMPUTATION

                 SMITTYS CATFISH POND FLOOD HYDROGRAPH

                     ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                      POND       0       0       0       0       3       1       0       0

                                  HYDROGRAPH DATA
              IHYDG    IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
                  0       2     .95    0.00     .95    1.00   0.000       0       0       0

                                    PRECIP DATA
                             NP   STORM     DAJ     DAK
                            192    8.84    0.00    0.00
                                   PRECIP PATTERN
           .02     .02     .02     .02     .02     .02     .02     .02     .02     .02
           .02     .02     .02     .02     .02     .02     .02     .02     .02     .02
           .02     .02     .02     .02     .02     .02     .02     .02     .02     .02
           .02     .02     .02     .02     .02     .02     .02     .02     .02     .02
           .02     .02     .02     .02     .02     .02     .02     .02     .02     .02
           .02     .02     .02     .02     .02     .02     .02     .02     .02     .02
           .02     .02     .02     .02     .02     .02     .02     .02     .02     .02
           .02     .02     .02     .02     .02     .02     .02     .02     .02     .02
           .02     .02     .02     .02     .02     .02     .02     .02     .02     .02
           .02     .02     .02     .02     .02     .02     .02     .02     .02     .02
           .02     .02     .02     .02     .02     .02     .02     .02     .02     .02
           .02     .02     .02     .02     .02     .02     .02     .02     .02     .02
           .04     .04     .04     .04     .04     .04     .04     .04     .04     .04
           .04     .04     .04     .04     .04     .04     .04     .04     .04     .04
           .04     .04     .04     .04     .08     .08     .08     .08     .08     .08
           .10     .10     .18     .18     .42     .77    1.69     .43     .18     .18
           .10     .10     .08     .05     .08     .08     .08     .08     .02     .02
           .02     .02     .02     .02     .02     .02     .02     .02     .02     .02
           .02     .02     .02     .02     .02     .02     .02     .02     .02     .02
           .02     .02
```

Output Summary
1% Probability Event
Pogue Lake Dam
MO 30127
B12

1.02	22.30	186	46.50	53.	62.	46.	816.5
1.02	22.45	187	46.75	51.	59.	46.	816.5
1.02	23.00	188	47.00	49.	56.	46.	816.5
1.02	23.15	189	47.25	48.	53.	46.	816.5
1.02	23.30	190	47.50	47.	51.	46.	816.5
1.02	23.45	191	47.75	46.	50.	46.	816.4
1.03	0.00	192	48.00	46.	49.	46.	816.4

PEAK OUTFLOW IS 805. AT TIME 41.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	805.	403.	128.	69.	12508.
CMS	23.	11.	4.	2.	354.
INCHES		3.94	5.03	5.10	5.10
MM		100.12	127.80	129.62	129.62
AC-FT		200.	255.	258.	258.
THOUS CU M		246.	314.	319.	319.

SUB-AREA RUNOFF COMPUTATION

RAIN STA. 18=LESTERVILLE, FREQ= 1.0, INTERVAL=15.0 MIN., DURATION= 48 HRS.

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
INFLOW 0	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
0	2	2.00	0.00	2.00	1.00	0.000	0	0	0

PRECIP DATA

NP	STORM	DAJ	DAK
-192	0.00	0.00	0.00

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	-1.00	-71.00	0.00	.01

CURVE NO = -71.00 WETNESS = -1.00 EFFECT CN = 71.00

UNIT HYDROGRAPH DATA

TC= 0.00 LAG= 1.90

RECESSION DATA

STRTQ= -1.00 QRCSN= -.05 RTIOR= 5.00

UNIT HYDROGRAPH 40 END OF PERIOD ORDINATES, TC= 0.00 HOURS, LAG= 1.90 VOL= 1.00

22.	68.	131.	220.	328.	413.	462.	476.	469.	432.
388.	333.	285.	210.	171.	139.	116.	96.	79.	64.
52.	43.	35.	28.	23.	19.	16.	13.	10.	9.
7.	6.	5.	4.	3.	3.	2.	1.	1.	0.

END-OF-PERIOD FLOW

NO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	NO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q

Output Summary
1% Probability Event
Pogue Lake Dam
MO 30127
B13

Output Summary
1% Probability Event
Pogue Lake Dam
MO 30127
B14

1.01	.15	1	.02	.00	.02	2.	1.02	.15	97	.02	.01	.01	20.
1.01	.30	2	.02	.00	.02	1.	1.02	.30	98	.02	.01	.01	20.
1.01	.45	3	.02	.00	.02	1.	1.02	.45	99	.02	.01	.01	21.
1.01	1.00	4	.02	.00	.02	1.	1.02	1.00	100	.02	.01	.01	22.
1.01	1.15	5	.02	.00	.02	1.	1.02	1.15	101	.02	.01	.01	23.
1.01	1.30	6	.02	.00	.02	1.	1.02	1.30	102	.02	.01	.01	24.
1.01	1.45	7	.02	.00	.02	1.	1.02	1.45	103	.02	.01	.01	25.
1.01	2.00	8	.02	.00	.02	1.	1.02	2.00	104	.02	.01	.01	26.
1.01	2.15	9	.02	.00	.02	1.	1.02	2.15	105	.02	.01	.01	27.
1.01	2.30	10	.02	.00	.02	1.	1.02	2.30	106	.02	.01	.01	28.
1.01	2.45	11	.02	.00	.02	1.	1.02	2.45	107	.02	.01	.01	29.
1.01	3.00	12	.02	.00	.02	1.	1.02	3.00	108	.02	.01	.01	30.
1.01	3.15	13	.02	.00	.02	1.	1.02	3.15	109	.02	.01	.01	31.
1.01	3.30	14	.02	.00	.02	1.	1.02	3.30	110	.02	.01	.01	32.
1.01	3.45	15	.02	.00	.02	1.	1.02	3.45	111	.02	.01	.01	33.
1.01	4.00	16	.02	.00	.02	1.	1.02	4.00	112	.02	.01	.01	34.
1.01	4.15	17	.02	.00	.02	1.	1.02	4.15	113	.02	.01	.01	35.
1.01	4.30	18	.02	.00	.02	1.	1.02	4.30	114	.02	.01	.01	35.
1.01	4.45	19	.02	.00	.02	1.	1.02	4.45	115	.02	.01	.01	36.
1.01	5.00	20	.02	.00	.02	1.	1.02	5.00	116	.02	.01	.01	37.
1.01	5.15	21	.02	.00	.02	1.	1.02	5.15	117	.02	.01	.01	37.
1.01	5.30	22	.02	.00	.02	1.	1.02	5.30	118	.02	.01	.01	38.
1.01	5.45	23	.02	.00	.02	1.	1.02	5.45	119	.02	.01	.01	39.
1.01	6.00	24	.02	.00	.02	1.	1.02	6.00	120	.02	.01	.01	39.
1.01	6.15	25	.02	.00	.02	1.	1.02	6.15	121	.04	.02	.02	40.
1.01	6.30	26	.02	.00	.02	1.	1.02	6.30	122	.04	.02	.02	41.
1.01	6.45	27	.02	.00	.02	1.	1.02	6.45	123	.04	.02	.02	43.
1.01	7.00	28	.02	.00	.02	1.	1.02	7.00	124	.04	.02	.02	45.
1.01	7.15	29	.02	.00	.02	1.	1.02	7.15	125	.04	.02	.02	49.
1.01	7.30	30	.02	.00	.02	1.	1.02	7.30	126	.04	.02	.02	53.
1.01	7.45	31	.02	.00	.02	1.	1.02	7.45	127	.04	.02	.02	58.
1.01	8.00	32	.02	.00	.02	1.	1.02	8.00	128	.04	.02	.02	63.
1.01	8.15	33	.02	.00	.02	1.	1.02	8.15	129	.04	.02	.02	68.
1.01	8.30	34	.02	.00	.02	1.	1.02	8.30	130	.04	.02	.02	73.
1.01	8.45	35	.02	.00	.02	1.	1.02	8.45	131	.04	.02	.02	78.
1.01	9.00	36	.02	.00	.02	1.	1.02	9.00	132	.04	.02	.02	82.
1.01	9.15	37	.02	.00	.02	1.	1.02	9.15	133	.04	.02	.02	86.
1.01	9.30	38	.02	.00	.02	1.	1.02	9.30	134	.04	.02	.02	89.
1.01	9.45	39	.02	.00	.02	1.	1.02	9.45	135	.04	.02	.02	93.
1.01	10.00	40	.02	.00	.02	1.	1.02	10.00	136	.04	.02	.02	95.
1.01	10.15	41	.02	.00	.02	1.	1.02	10.15	137	.04	.02	.02	98.
1.01	10.30	42	.02	.00	.02	1.	1.02	10.30	138	.04	.02	.02	100.
1.01	10.45	43	.02	.00	.02	1.	1.02	10.45	139	.04	.02	.02	103.
1.01	11.00	44	.02	.00	.02	1.	1.02	11.00	140	.04	.02	.02	105.
1.01	11.15	45	.02	.00	.02	1.	1.02	11.15	141	.04	.02	.02	107.
1.01	11.30	46	.02	.00	.02	1.	1.02	11.30	142	.04	.02	.02	109.
1.01	11.45	47	.02	.00	.02	1.	1.02	11.45	143	.04	.02	.02	110.
1.01	12.00	48	.02	.00	.02	1.	1.02	12.00	144	.04	.02	.02	112.
1.01	12.15	49	.02	.00	.02	1.	1.02	12.15	145	.08	.04	.03	114.
1.01	12.30	50	.02	.00	.02	1.	1.02	12.30	146	.08	.05	.03	117.
1.01	12.45	51	.02	.00	.02	1.	1.02	12.45	147	.08	.05	.03	121.
1.01	13.00	52	.02	.00	.02	1.	1.02	13.00	148	.08	.05	.03	127.
1.01	13.15	53	.02	.00	.02	1.	1.02	13.15	149	.08	.05	.03	135.
1.01	13.30	54	.02	.00	.02	1.	1.02	13.30	150	.09	.05	.03	145.
1.01	13.45	55	.02	.00	.02	1.	1.02	13.45	151	.10	.07	.04	156.
1.01	14.00	56	.02	.00	.02	1.	1.02	14.00	152	.10	.07	.04	169.
1.01	14.15	57	.02	.00	.02	1.	1.02	14.15	153	.18	.12	.06	184.
1.01	14.30	58	.02	.00	.02	1.	1.02	14.30	154	.18	.12	.06	203.
1.01	14.45	59	.02	.00	.01	1.	1.02	14.45	155	.42	.30	.12	230.

1.01	15.00	60	.02	.00	.01	2.	1.02	15.00	156	.77	.58	.19	277.
1.01	15.15	61	.02	.00	.01	2.	1.02	15.15	157	1.69	1.36	.32	970.
1.01	15.30	62	.02	.00	.01	2.	1.02	15.30	158	.43	.37	.07	914.
1.01	15.45	63	.02	.00	.01	3.	1.02	15.45	159	.18	.16	.03	709.
1.01	16.00	64	.02	.00	.01	3.	1.02	16.00	160	.18	.15	.02	933.
1.01	16.15	65	.02	.00	.01	4.	1.02	16.15	161	.10	.09	.01	1176.
1.01	16.30	66	.02	.00	.01	4.	1.02	16.30	162	.10	.09	.01	1368.
1.01	16.45	67	.02	.00	.01	5.	1.02	16.45	163	.08	.07	.01	1486.
1.01	17.00	68	.02	.00	.01	5.	1.02	17.00	164	.08	.07	.01	1528.
1.01	17.15	69	.02	.00	.01	6.	1.02	17.15	165	.08	.07	.01	1507.
1.01	17.30	70	.02	.00	.01	6.	1.02	17.30	166	.08	.07	.01	1428.
1.01	17.45	71	.02	.00	.01	7.	1.02	17.45	167	.08	.07	.01	1319.
1.01	18.00	72	.02	.00	.01	7.	1.02	18.00	168	.08	.07	.01	1181.
1.01	18.15	73	.02	.00	.01	8.	1.02	18.15	169	.02	.02	.00	1030.
1.01	18.30	74	.02	.00	.01	9.	1.02	18.30	170	.02	.02	.00	898.
1.01	18.45	75	.02	.00	.01	9.	1.02	18.45	171	.02	.02	.00	790.
1.01	19.00	76	.02	.00	.01	10.	1.02	19.00	172	.02	.02	.00	696.
1.01	19.15	77	.02	.00	.01	10.	1.02	19.15	173	.02	.02	.00	615.
1.01	19.30	78	.02	.00	.01	11.	1.02	19.30	174	.02	.02	.00	539.
1.01	19.45	79	.02	.00	.01	11.	1.02	19.45	175	.02	.02	.00	471.
1.01	20.00	80	.02	.00	.01	12.	1.02	20.00	176	.02	.02	.00	410.
1.01	20.15	81	.02	.00	.01	12.	1.02	20.15	177	.02	.02	.00	357.
1.01	20.30	82	.02	.00	.01	13.	1.02	20.30	178	.02	.02	.00	311.
1.01	20.45	83	.02	.00	.01	13.	1.02	20.45	179	.02	.02	.00	272.
1.01	21.00	84	.02	.00	.01	14.	1.02	21.00	180	.02	.02	.00	239.
1.01	21.15	85	.02	.00	.01	14.	1.02	21.15	181	.02	.02	.00	213.
1.01	21.30	86	.02	.00	.01	15.	1.02	21.30	182	.02	.02	.00	191.
1.01	21.45	87	.02	.00	.01	15.	1.02	21.45	183	.02	.02	.00	174.
1.01	22.00	88	.02	.00	.01	16.	1.02	22.00	184	.02	.02	.00	160.
1.01	22.15	89	.02	.00	.01	16.	1.02	22.15	185	.02	.02	.00	148.
1.01	22.30	90	.02	.00	.01	17.	1.02	22.30	186	.02	.02	.00	139.
1.01	22.45	91	.02	.00	.01	17.	1.02	22.45	187	.02	.02	.00	131.
1.01	23.00	92	.02	.00	.01	17.	1.02	23.00	188	.02	.02	.00	125.
1.01	23.15	93	.02	.00	.01	18.	1.02	23.15	189	.02	.02	.00	120.
1.01	23.30	94	.02	.00	.01	18.	1.02	23.30	190	.02	.02	.00	115.
1.01	23.45	95	.02	.00	.01	19.	1.02	23.45	191	.02	.02	.00	112.
1.02	0.00	96	.02	.00	.01	19.	1.03	0.00	192	.02	.02	.00	109.
....	....	..	...	...	...	...	...	...					
									SUM	8.89	5.40	3.49	26929.
										226.06	137.16	88.90	762,439

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1920.	840.	275.	140.	26861.
CMS	54.3.	24.	8.	4.	761.
INCHES	.02	3.91	5.12	5.21	5.21
MM		99.23	130.09	132.22	132.22
AC-FT		416.	546.	555.	555.
THOUS CU M		514.	674.	685.	685.

Output Summary
1% Probability Event
Pogue Lake Dam
MO 30127
B15

COMBINE HYDROGRAPHS

COMBINE FLOW WITH THE OUT FLOW FROM SHITTYS CATFISH POND

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO

RUNOFF SUMMARY. AVERAGE FLOW IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES(SQUARE KILOMETERS)

		PEAK	6-HOUR	24-HOUR	72-HOUR	AREA
HYDROGRAPH AT	POND	833.	404.	131.	67.	.95
		(23.59)(	11.44)(	3.71)(	1.89)(	2.46)
ROUTED TO	DAM	805.	403.	128.	65.	.95
		(22.79)(	11.40)(	3.64)(	1.84)(	2.46)
HYDROGRAPH AT	INFLOW	1528.	840.	275.	140.	2.00
		(43.25)(	23.78)(	7.80)(	3.96)(	5.18)
2-COMBINED	LAKE	2332.	1242.	404.	205.	2.95
		(66.05)(	35.18)(	11.43)(	5.81)(	7.64)
ROUTED TO	DAM	2306.	1240.	401.	203.	2.95
		(65.31)(	35.11)(	11.35)(	5.74)(	7.64)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	767.10	767.10	770.50
STORAGE	43.	43.	74.
OUTFLOW	0.	0.	1538.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	771.37	.87	83.	2306.	2.00	41.25	0.00

Output Summary
12 Probability Event
Pogue Lake Dam
MO 30127
B16